



**A Departmental Response to the Presidential Memorandum -- Accelerating  
Technology Transfer and Commercialization of Federal Research in Support  
of High-Growth Businesses**

*Report prepared by:*

USDA Office of the Chief Scientist  
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Pursuant to the  
**Presidential Memorandum -- Accelerating Technology Transfer and Commercialization of Federal Research  
in Support of High-Growth Businesses, October 28, 2011**

September 13, 2012

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### EXECUTIVE SUMMARY

On October 28, 2011, following a series of reports identifying the status of technology transfer from federal funds and federal laboratories, the White House issued the Presidential Memorandum – Accelerating Technology Transfer and Commercialization of Federal Research in Support of High-Growth Businesses” (attachment 1). The memorandum requires federal agencies – within 180 days -- to submit 5-year plans to accelerate technology transfer and commercialization, and to report annually on progress toward achieving these goals.

The principal goal of Federal research and development (R&D) is to solve problems and achieve anticipated public benefit. The U.S. Department of Agriculture views the Presidential Memorandum with a broad interpretation, defining technology transfer as ***the adoption of research outcomes (i.e., solutions) for public benefit***. Seemingly a simple statement, that process of adoption is complicated, requiring integration of many assets from disparate sources in the successful delivery of solutions through public / private partnerships.

Successful adoption of USDA knowledge and research outcomes typically requires complementary assets and services provided by multiple agencies in USDA, including agencies that are not primarily engaged in direct research in the physical and life science arenas. The breadth of scope of USDA science and technology (S&T) agencies – spanning the mission areas of four Under Secretaries -- creates some unique challenges. USDA R&D is conducted in agencies with responsibilities ranging from 100% intramural research (e.g., ARS), agencies with units dedicated 100% to research (e.g., APHIS-Wildlife Services- National Wildlife Research Center), to agencies with “methods development” research elements but also regulatory responsibilities (e.g., APHIS-Veterinary Services, and APHIS-Plant Protection and Quarantine) as well as those agencies entrusted with land management responsibilities, including natural resources preservation (e.g., Forest Service).

Issuance of the Presidential Memorandum, therefore, provides an unprecedented opportunity for unifying technology transfer across USDA S&T agencies as the mechanism to deliver these outcomes for public good. This report describes four agencies with science research missions that develop innovations in the agriculture sector, and seven agencies that contribute resources and services to enhance success and global competitiveness of the businesses that adopt the innovations for commercialization.

Collectively, 32 initiatives, referenced by “USDA [#]” markings are identified in this document to promote technology transfer and commercialization during the 2013-2017 time frame. These are grouped in five categories depicted in the following table.

## USDA Response to the Presidential Memo on Technology Transfer and Commercialization

Table of contributions of USDA agencies to activities promoting technology transfer and commercialization. Specifics are provided in agency sections within this report.

Agency	Strengthen Current Activities	Improving / developing new metrics	Increase Awareness of Technology Transfer Mechanisms	Increase Pace of Technology Transfer & Commercialization	Provide Support Services to Enhance Business Success
Agricultural Research Service (ARS)	✓	✓	✓	✓	
Forest Service (FS)	✓	✓	✓	✓	
Animal and Plant Health Inspection Service (APHIS) – Wildlife Services (WS)	✓	✓	✓	✓	
APHIS Veterinary Services (VS)					✓
APHIS Plant Protection and Quarantine (PPQ)	✓		✓		✓
APHIS Biotechnology Regulatory Services (BRS)					✓
APHIS International Services (IS)					✓
National Institute of Food and Agriculture (NIFA)	✓	✓	✓		
Economic Research Service (ERS)					✓
National Agricultural Statistics Service					✓
Foreign Agricultural Service (FAS)					✓
Rural Development (RD)	✓				✓
Agricultural Marketing Service (AMS)	✓				✓
Grain Inspection, Packers and Stockyards Administration (GIPSA)	✓				✓
Food Safety Inspection Service (FSIS)					✓

The Office of Technology Transfer (OTT) in the Agricultural Research Service (ARS) has been delegated authority by the Secretary of Agriculture to administer the patent program for ARS, and the technology licensing program and the review of CRADAs for all intramural research conducted by USDA, and thus, plays a central and coordinating role for the Department.

Thirteen initiatives are listed by ARS, including a new research agreement instrument (a Material Transfer Research Agreement), advanced training of USDA scientists on obligations and opportunities in technology transfer; enhanced formal policies and procedures; new models of partnering with economic development entities to facilitate commercialization; mechanisms to partner with other agencies on small business development, manufacturing assistance, accessing fiscal resources, mentors, and entrepreneurs to support businesses; evaluating various options for reducing license negotiation transaction costs; and special initiatives to fast track commercialization involving NIFA and Rural Development, university incubators, the Department of Defense, the National Institute for Standards and Technology, and the National Cancer Institute.

The Forest Service identifies six initiatives; seven are identified by APHIS programs, and a total of six initiatives are identified from NIFA, ERS, and FAS. Activities to support entrepreneurship are described by ARS, FS, NIFA, and RD with the latter two agencies also providing mechanisms to fund businesses in the scale up and production of goods and services. Other activities that support business success include economic analysis within the agriculture sector, statistics on agriculture productivity, and opportunities to enhance global competitiveness, fair trade, and increased exports.

Most of the initiatives described in this plan will begin in FY 2013 and will continue through the five year period, ushering in a new era of unprecedented collaboration among agencies of USDA to enhance services and opportunities to the customers and stakeholders of the Department. The agencies that have contributed to this plan will report on progress annually through the USDA Science Council, convened by the Chief Scientist, Under Secretary Cathie Woteki. Reports will be compiled and integrated into the Annual Report on Technology Transfer, required by 15 USC Sec. 3710(f)(2).

### Foreward


Beginning with the release in September 2009 of the “*Strategy for American Innovation: Driving Towards Sustainable Growth and Quality Jobs*,” President Obama’s administration has embarked on a number of initiatives that elevate the importance of innovation as a driver of the U.S. economy. Contributions of the White House Innovation and Entrepreneurship working group, established in December 2009, resulted in the launch of Startup America on January 31, 2011, release of the “*Strategy for American Innovation: Securing our Economic Growth and Prosperity*” February 4, 2011, and publication by the Science and Technology Policy Institute of *Technology Transfer and Commercialization Landscape of the Federal Laboratories*”.

The latter report captured a snapshot of current technology transfer practices in federal intramural research laboratories. The Interagency Work Group for Technology Transfer, established by the Department of Commerce in the late 1980’s used this report to generate policy recommendations on ways to enhance federal technology transfer from intramural research laboratories. The result was the issuance on October 28, 2011, of the “*Presidential Memorandum – Accelerating Technology Transfer and Commercialization of Federal Research in Support of High-Growth Businesses*.”

If narrowly interpreted, the Presidential Memorandum is a call to accelerate transfer of research outcomes through traditional intellectual property mechanisms of copyrighting, patenting and licensing in support of high-growth businesses such as information technology, healthcare, and other sectors characterized by high profit margins and mass markets. In contrast, the agriculture and forest sectors are largely characterized by commodity and niche markets, with thin profit margins. These sectors focus on meeting basic life-sustaining needs of fiber, safe and abundant foods to promote lifelong good health, and safe water for a growing world population, all while protecting the health, vitality and abundance of our nation’s natural resources. Achieving this means careful management of scarce and precious natural resources of forest and arable land, energy, and water that may not be proximal to population centers.

Thus, the U.S. Department of Agriculture views the Presidential Memorandum with a broader interpretation. It is a call to support the agriculture and forest sectors in a manner that ensures sustainable agriculture and forests, creates and nurtures opportunities for farmers, ranchers, forest owners, and entrepreneurs to flourish in both urban and rural areas, protects the nation’s food supply, and enhances global competitiveness of U.S. agriculture and forest industries.

The plan described in this report captures the current practices and plans to accelerate adoption and commercialization of USDA research outcomes to promote science-based innovation, sustainable economic development, and global competitiveness of the U.S. agriculture and forest sectors.



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### Introduction

#### U.S. Department of Agriculture (USDA): The Culture of “Technology Transfer” and Overview of Agencies

<http://www.usda.gov/>

This year marks the 150<sup>th</sup> anniversary of the Department of Agriculture. Established on May 15, 1862, President Abraham Lincoln later coined the phrase “the People’s Department” in acknowledging the role of the Department in solving problems for the agriculture sector that benefits all people every day. Thus, well before the coining of the modern day phrase of “technology transfer,” it was the culture of USDA to deliver these solutions to the people of the United States. Today, USDA broadly defines technology transfer as the ***adoption of research outcomes (i.e., solutions) for public benefit***. Seemingly a simple statement, that process of adoption is complicated, requiring integration of many assets from disparate sources in the successful delivery of solutions. “Public benefit” is achieved through many mechanisms including public release of information, tools, and solutions (e.g., germplasm, plants and other materials), adoption by partners through collaborative research, formal cooperative research and development agreements (CRADA) authorized by the Federal Technology Transfer Act (1986), direct federal, state, or local technical assistance, or through licensing of biological materials or protected intellectual property directly to not-for-profit entities and for-profit private sector firms. Additionally, successful adoption of USDA knowledge and research outcomes typically requires complementary assets and services provided by multiple agencies in USDA, including agencies that are not primarily engaged in direct research in the physical and life science arenas.

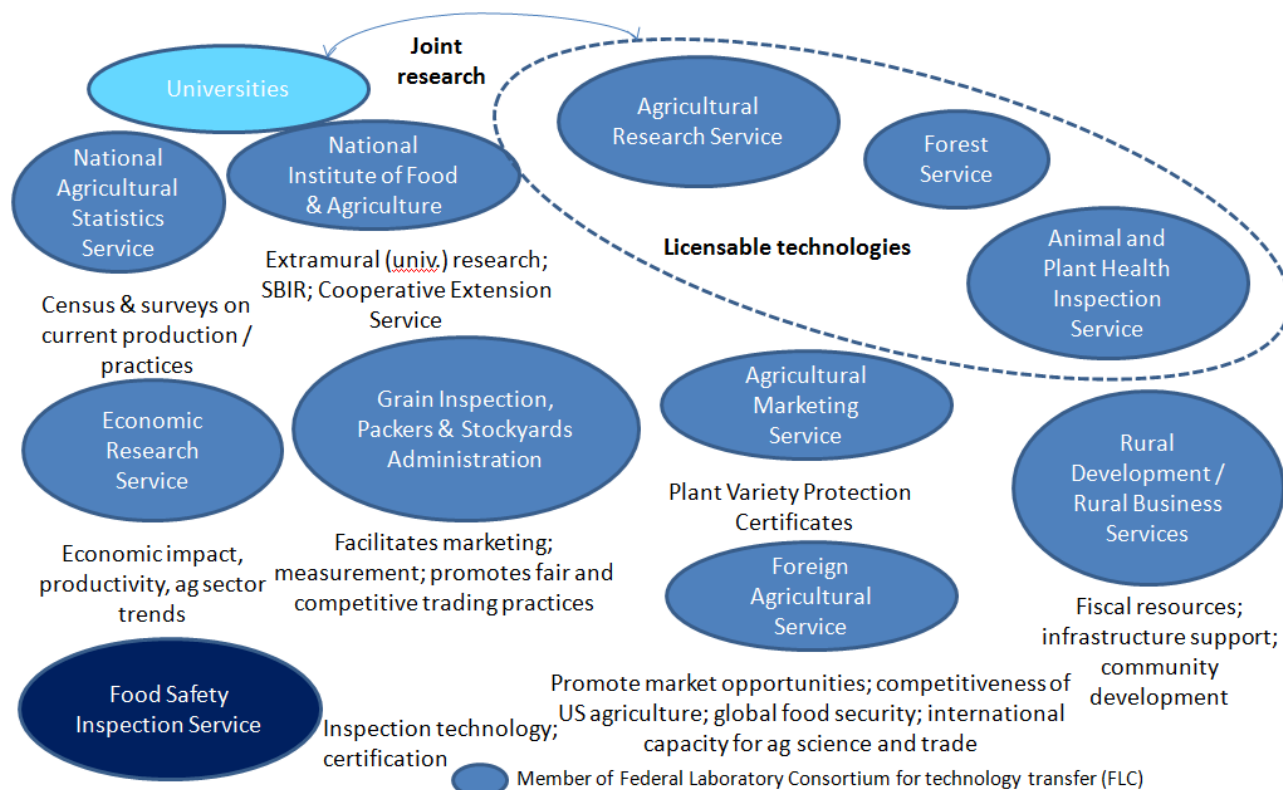
Agencies themselves seldom can transfer technologies and knowledge alone; except where benefit is provided directly by federal, state, or municipal entities, the private sector serves as the essential delivery mechanism and intermediary between public research and realization of public benefit. Additionally, private sector involvement also adds the benefits of creating new or expanded businesses, jobs, and economic prosperity.

Science-based innovations from USDA intramural research --- often developed through public / private partnerships --- create new or improved technologies, processes, products and services that benefit the nation by increasing productivity, increasing efficiency (keeping costs low) and enhancing global competitiveness for the U.S. agriculture sector. Thus, technology transfer functions are critical to accelerating utility of public R & D investments, creating economic activity, and in job creation and sustainable economic development.

The Agricultural Research Service (ARS) has been delegated authority by the Secretary of Agriculture to administer the patent program for ARS, and the review of CRADAs and the technology licensing program for all intramural research conducted by USDA. These activities are housed in the Office of Technology Transfer. Thus, ARS has a broad advisory role in the research partnerships that may produce intellectual property, and on establishing the partnerships with the private sector to commercialize the research outcomes. Accordingly, the Office of Technology Transfer is the coordinating entity for preparation of this report.

A number of USDA agencies are members of the Federal Laboratory Consortium (FLC) for technology transfer. Membership is conferred by having an intramural research or a research administration budget as identified in Table 10 of the National Science Foundation (NSF) report on “Federal Funds for Research and Development.” Figure 1 shows USDA agencies that are members, and also illustrates the scope of agency activities that contribute to successes in technology transfer and commercialization.

**Figure 1. Contributions of USDA Science and Technology Agencies to Technology Transfer and Commercialization in the Agriculture Sector.**



According to NSF data for FY 2010, four agencies account for 95 percent of the intramural research investment in USDA. These are the Agricultural Research Service (ARS; \$1,084M), Forest Service (FS R&D; \$307M), Economic Research Service (ERS; \$83M), and the Animal and Plant Health Inspection Service (APHIS; \$28M). Of these, ARS, FS, and APHIS are more likely than other agencies to produce outcomes in the execution of research and methods development programs that can and should be protected by utility patents, plant patents, and plant variety protection certificates.

The National Institute for Food and Agriculture (NIFA) does not conduct research directly, but manages 93 percentage of the extramural research portfolio of USDA, providing assistance to Land-Grant and other universities, colleges, and other research organizations, including small businesses, and provides funding and leadership to the renowned Cooperative Extension Service that has provided technology transfer and technical assistance to farmers and woodland owners since 1914. Recipients of NIFA funding also partner extensively with ARS, FS, and APHIS.

Forest Service State and Private Forestry also provides support to the network of State Forests in a similar capacity to Cooperative Extension. In several instances, the other Science and Technology (S&T) agencies such as Food Safety Inspection Service (FSIS) and the Grain Inspection, Packers & Stockyards Administration (GIPSA), and components of the Forest Service and the Animal and Plant Health Inspection Service (APHIS) also engage ARS scientists and those of universities to conduct research essential to support their missions.

This response to the Presidential Memorandum is presented in two parts. Section A includes those agencies that are likely to produce outcomes that can be adopted directly by the private sector – either through public release of knowledge or by transfer of protected intellectual property through research partnerships and/or invention license agreements. Section B includes those agencies that do not conduct or oversee intramural / extramural research, but contribute to economic viability of U.S. firms in the agriculture sector through programs that support business success.

For each agency reporting herein, information is provided on the mission of the agency; the nature and structure of research programs; current technology transfer goals, objectives and measures of success; the strengthening of metrics, the strengthening of current activities, and new initiatives. These sections may vary depending on the mission of the agency.

Initiatives to be strengthened and new initiatives in support of the Presidential Memorandum will be identified by “USDA [#]” nomenclature. Progress on implementing these, and monitoring for performance, will be reported annually in the United States Department of Agriculture Annual Reporting on Technology Transfer, in response to the requirements identified for the annual “agency report on utilization” by 15 USC Sec. 3710 (f)(2).

**SECTION A: AGENCIES WITH SIGNIFICANT INTRAMURAL RESEARCH OR MANAGEMENT OF  
EXTRAMURAL RESEARCH LIKELY TO PRODUCE DIRECT TECHNOLOGY TRANSFER  
TRANSACTIONS, INCLUDING LICENSABLE RESEARCH OUTCOMES**

**Agricultural Research Service (ARS)**  
<http://www.ars.usda.gov/main/main.htm>

**Mission Statement**

ARS conducts research to develop and transfer solutions to agricultural problems of high national priority and provides information access and dissemination to:

- ensure high-quality, safe food, and other agricultural products;
- assess the nutritional needs of Americans;
- sustain a competitive agricultural economy;
- enhance U.S. natural resources and the environment; and
- provide economic opportunities for rural citizens, communities, and society as a whole.

**Nature and Structure of Research Program**

ARS is USDA's principal intramural scientific research agency. Agency goals are to find solutions to agricultural problems that affect Americans every day, from field to table, such as (a) protecting crops and livestock from pests and diseases, (b) improving the quality and safety of agricultural products, (c) determining the best nutrition for people from infancy to old age, (d) sustaining our soil and other natural resources, (e) ensuring profitability for farmers and processors, and (f) keeping costs down for consumers.

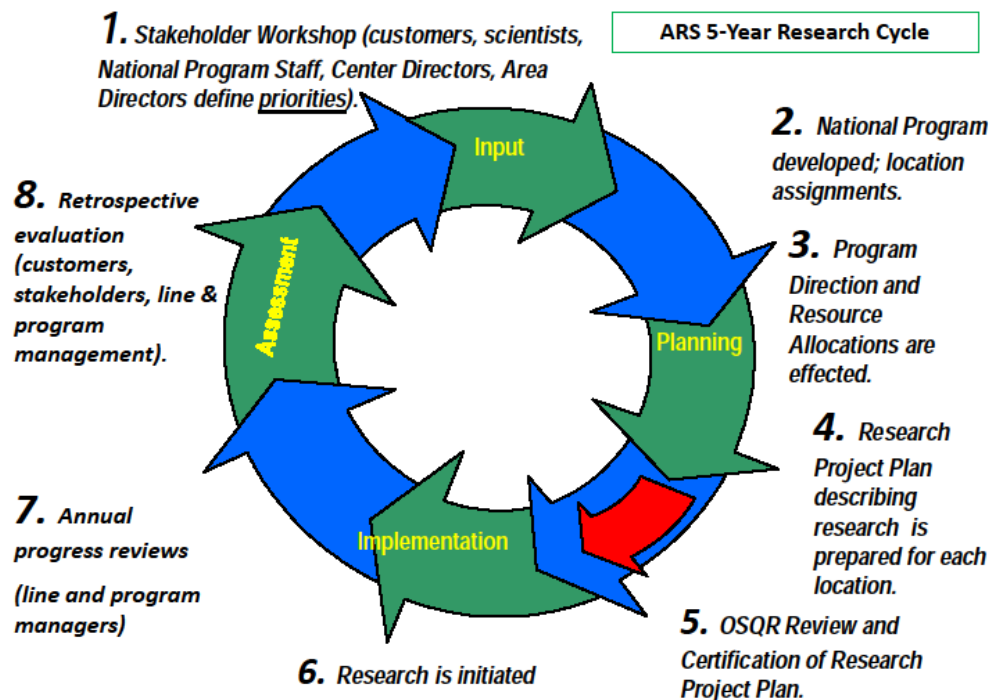
ARS employs over 8,000 people; approximately 1,950 permanent full-time scientists and approximately 3,300 technical and support staffs conduct research in projects funded by Congressional appropriations at more than 90 locations. Research projects are grouped into 19 National Programs under the four broad pillars of Animal Production and Protection; Nutrition, Food Safety and Quality; Natural Resources and Sustainable Agricultural Systems; and Crop Production and Protection. The Office of National Programs in Beltsville, MD coordinates the scope and objectives of Agency research projects, while eight Area Directors implement research projects at the locations in their geographic areas.

**Table 1. Research program management of ARS, showing 19 National Programs in four pillars.**

<b>Animal Production &amp; Protection</b>	<b>Natural Resources &amp; Sustainable Ag Systems</b>	<b>Crop Production &amp; Protection</b>	<b>Nutrition, Food Safety and Quality</b>
Food Animal Production	Water Availability & Watershed Management	Plant Genetic Resources, Genomics & Genetic Improvement	Human Nutrition
Animal Health	Climate Change, Soils, and Emissions	Plant Biological & Molecular Processes	Food Safety (animal & plant products)
Veterinary, Medical, & Urban Entomology	Pasture, Forage & Range Land Systems	Plant Diseases	Quality and Utilization of Agricultural Products
Aquaculture	Bioenergy	Crop Protection & Quarantine	
	Agricultural & Industrial Byproduct	Crop Production	
	Agricultural System Competitiveness & Sustainability	Methyl Bromide Alternative	

ARS conducts a series of review processes designed to ensure the relevance and quality of its research work and to maintain the highest possible standards for its scientists (Figure 2.). This process involves customer input to help keep the research focused on the needs of the American food and agricultural system. Each of the approximately 1,000 research projects undergoes a thorough independent external prospective peer review conducted by the Office of Scientific Quality Review (OSQR). All ARS employees, including the scientific workforce, are subject to annual performance reviews, and all scientists and engineers have technology transfer as a performance element in their annual performance appraisal. Senior scientists undergo a rigorous peer review (Research Position Evaluation System-RPES) on a 3- to 5-year cycle. These processes ensure the continuing high quality output of the ARS research addressing the needs of American agriculture.

**Figure 2. The ARS 5-year research cycle ensures accountability and market relevance to the agriculture sector.**



### Current Technology Transfer Goals, Objectives, and Measures of Success

Because of the delegations of authority by the Secretary (stated previously), ARS's Office of Technology Transfer (OTT) is assigned the responsibility for obtaining patent protection for intellectual property (IP), developing strategic partnerships with outside organizations, and performing other activities that effectively transfer ARS research outcomes and technologies to the marketplace. USDA's Office of the General Counsel provides legal guidance to OTT in regard to intellectual property

The technology transfer operation is centralized in policy and approval procedures, and maintains field offices to provide one-on-one customer service to intramural researchers. To facilitate technology transfer, the office is organized into five sections. The *Administrative/Headquarters Section* conducts day-to-day operations, coordinates technology transfer policy development, and executes licenses and Cooperative Research and Development Agreements (CRADAs). The *Patent Section* (8 in-house registered patent agents) provides strategic guidance to scientists in protecting IP, coordinates invention reports and Invention Disclosure Review Committees, prepares and prosecutes patent applications, and oversees any patent applications prepared by cooperator law firms for domestic and foreign patent rights and contract law firms for foreign patent rights. The *Licensing Section* (4 specialists) negotiates



licenses for IP developed by intramural scientists in any USDA agency and monitors license performance. The *Marketing Section* (staff of 3) develops, implements, and coordinates marketing strategies to facilitate available information to support technology transfer. ARS has five *Technology Transfer Coordinators* (TTCs) strategically stationed across the United States, who are responsible for facilitating the development and transfer of USDA technologies. They serve as liaisons with scientists, ARS managers, university partners, and the private sector. They also negotiate CRADAs and other technology transfer agreements. The TTC for the Northern Plains Area, located in Ft. Collins, CO, also serves as the principal contact and liaison for scientists conducting research within APHIS Wildlife Services (WS). The principal contact for technology transfer within the FS is the Patent Advisor located at the Forest Products Laboratory in Madison, WI.

Technology transfer is accomplished through many mechanisms, such as:

- developing written information for customers and stakeholders, including scientific publications, publications in trade journals, and reports to stakeholders;
- releasing plant germplasm to the public;
- transferring research materials to scientists outside of ARS;
- entering into formal partnership agreements, such as CRADAs, and other cooperative agreements;
- delivering specific research results to regulatory agencies to support their actions;
- licensing IP (patents, Plant Variety Protections Certificates, and biological materials);
- participating in meetings with industry organizations and universities, workshops and field days; and
- distributing information to the public via the ARS Information Staff, the National Agricultural Library, and other sources.

Because the ARS mission is to transfer technologies for broad public use by the most effective mechanism, ARS pursues patents and licensing principally when this facilitates technology transfer to the marketplace. This is usually the case when complementary investment by the private sector is necessary to commercialize a product, and patent protection is required to protect this investment. By policy of ARS, IP related to research tools is not protected so as to encourage scientific research. In licensing practices, ARS continues to reserve the right to allow use of any protected technology for research purposes (non-commercial).

ARS holds periodic patent committee meetings to review invention disclosures and make recommendations to the Assistant Administrator for Technology Transfer on whether a patent is necessary to facilitate technology transfer. Three national patent committees (Mechanical & Measurement, Life Sciences, Chemistry) each have 12-15 members (ARS scientists) that review invention disclosures submitted and vote on whether to (a) proceed with patenting, (b) defer for additional data or for a CRADA partner, or (c) suspend IP protection and instead use alternative mechanisms of technology transfer to promote adoption / commercialization. Each of the three committees is convened quarterly by ARS Patent Advisors. OTT also convenes a Foreign Filing Patent Committee to make recommendations as to whether foreign intellectual property rights should be pursued.

Performance metrics are reported annually in response to the requirements identified for annual “agency report on utilization” by 15 USC Sec. 3710 (f)(2), and as enumerated in circular A-11 of the budget submission process. Sections include CRADAs and other R&D activity, Invention Disclosure and Patenting, Licensing, Income Bearing Licenses, Licensing Management, Licensing Income, and Disposition of Licensing Income. In addition to these tabular data, ARS reports “Downstream Outcomes” from technology transfer activities. This section is qualitative, and provides impact arising from the adoption of research outcomes by end users of the technology.

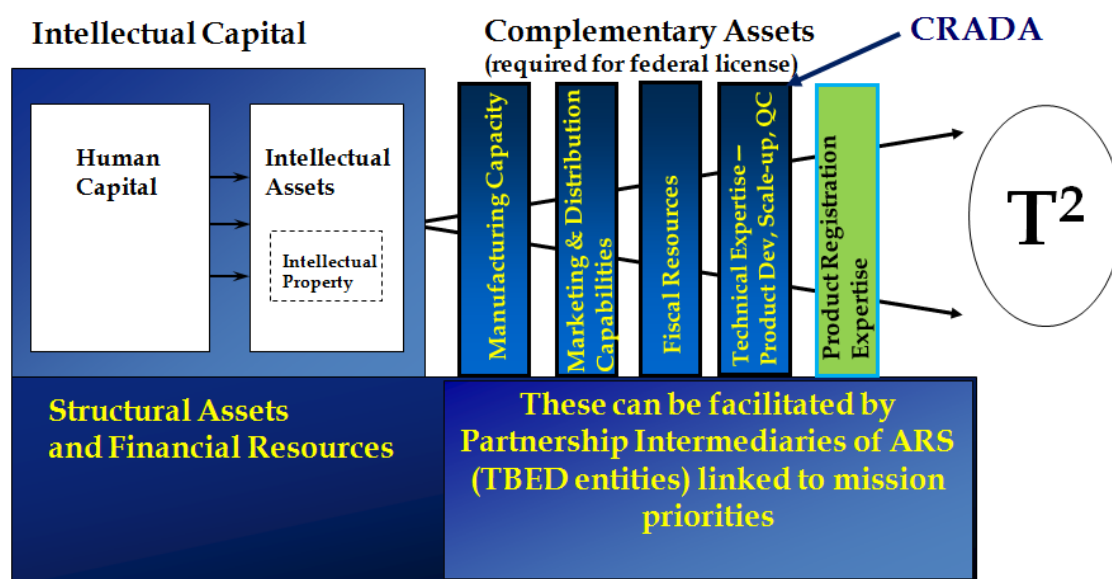
### **Development of the Agricultural Technology Innovation Partnership program (ATIP) to Enhance Technology Transfer Performance**

It is clear that our nation is facing grave important issues of food security, water availability and quality, sustainable biofuels and alternative energy development, increased global competition, and economic instability. Traditionally, innovation and small business development have been critical to the nation’s global competitiveness and in achieving sustainable local/regional economic development. The recent global economic downturn has further highlighted the urgency to focus on innovation, competitiveness, and job creation. Thus, to help meet these challenges and enhance partnering with small businesses, ARS initiated an Agricultural Technology Innovation Partnership (ATIP) program to further enhance likelihood that research outcomes would be adopted by the private sector for commercialization. The program was born from the recognition that federal intramural R&D agencies were limited by mission and resources in the services they can provide to U.S. businesses.

The ATIP program represents a new model to promote public / private partnerships for commercialization of research outcomes (Figure 3). By statute, licensing any federal innovation requires that the applicant (business) provide a complete and sufficient business plan that describes their capabilities in marketing, manufacturing, access to fiscal resources, and their technical capabilities to develop products and services from the technology. Federal intramural R&D agencies can only offer “technical capabilities” through formal CRADAs with the licensee, but have neither the resources nor the authority to assist with the other requirements of licensees (assets) needed by these businesses to be successful. Consequently, ATIP was established to strategically form geographic partnerships with well-established technology-based economic development (TBED) entities that excel in providing the complementary assets that ARS cannot.



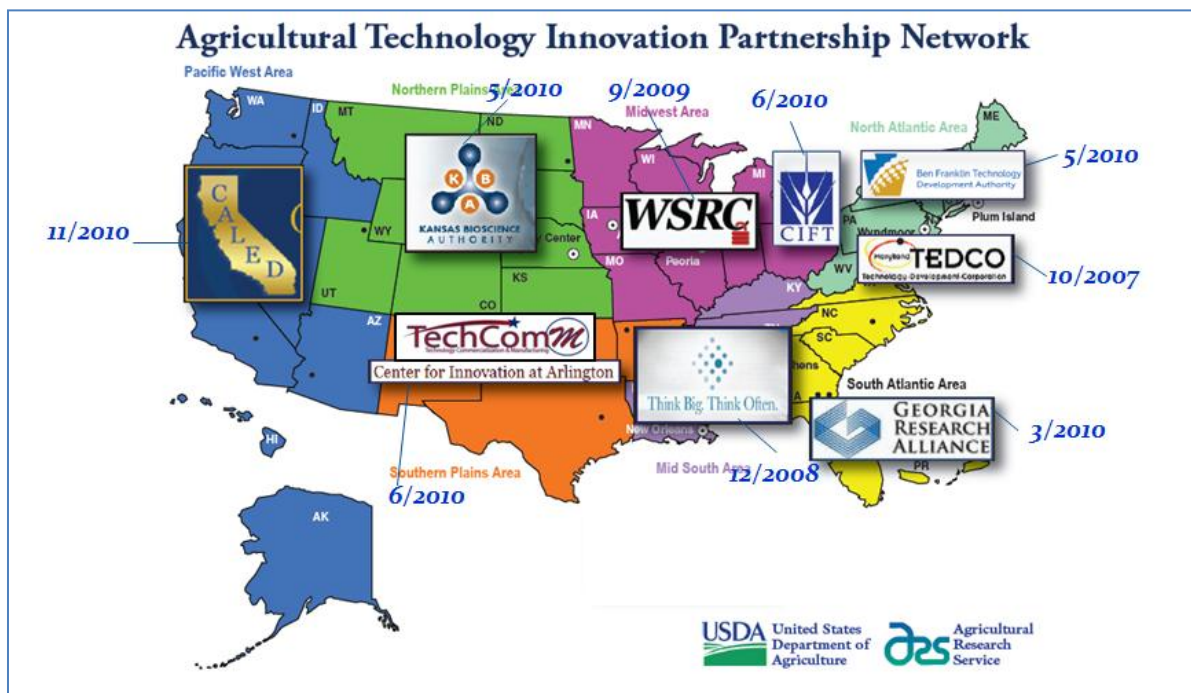
**Figure 3. The model of public / private partnerships needed to promote commercialization of research outcomes. See text for explanation of figure. T<sup>2</sup> is technology transfer.**



Adapted from Sullivan, P.H., *Profiting From Intellectual Capital*, John Wiley & Sons, New York, 2000.

The ATIP Network (Figure 4) is comprised of 9 technology-based economic development (TBED) “Partners”, each serving as a portal anchored to an ARS Area. Partners become members of ATIP through a Partnership Intermediary Agreement (PIA) executed with the Office of Technology Transfer. Members of ATIP include the Maryland Technology Development Corporation (TEDCO), Mississippi Technology Alliance (MTA), Wisconsin Security Research Consortium (WSRC), Georgia Research Alliance (GRA), Ben Franklin Technology Development Authority (BFTDA), Kansas Bioscience Authority (KBA), Center for Innovation at Arlington, TX (CFI), California Association for Local Economic Development (CALED), and the Center for Innovative Food Technologies, Toledo, OH (CIFT).

**Figure 4. The Agricultural Technology Innovation Partnership (ATIP) Network of ARS. Logos of members are accompanied by the date when joining the network.**



In 2011, the members of ATIP established a Foundation to provide both a unifying entity for the members external to ARS, as well as flexibility to engage other organizations that have a vested interest in seeing USDA research outcomes adopted by the private sector. Initial activities of the Foundation to be reported beginning FY 2013 will focus on developing a common message for outreach as to the purpose, structure, and function of ATIP; mechanisms and opportunities available to the private sector companies to partner with USDA; and establishing --coordinated among the members -- a calendar of themed regional showcases and forums to highlight ARS and USDA technologies and research programs. Beginning in FY 2013, their intent is to develop a technology transfer commercialization fund for the ATIP Foundation to assist private sector partners of USDA in bringing goods and services to the market from USDA laboratories.

### Strengthening Performance Metrics

Over the past few years, ARS has added some tabular metrics beyond those required by OMB Circular A-11 instructions for annual reporting to Congress as part of the President's budget submission. Additions included Material Transfer CRADAs (a limited CRADA based on materials provided by the private sector), CRADAs with multiple partners (e.g., a 3-party CRADA), CRADAs with foreign partners, amendments to CRADAs, Material transfer agreements (with a footnoted tally of number of outgoing materials), and scientific germplasm releases. For specific example, see the FY 2010 Annual Report at the following link

<https://www.ars.usda.gov/sp2UserFiles/Place/01090000/FY2010%20Annual%20Report%20on%20USDA%20Technology%20Transfer%208%203%2011.pdf>

In response to this Presidential Memorandum, ARS will initiate some new performance metrics shown in Table 2 above those already reported in the Annual Report on Technology Transfer, and formalize those that had been added voluntarily. These metrics will enhance our ability to better monitor partnerships with small businesses, and/or quantify some activities specific to USDA technology transfer.

**Table 2. USDA 1: New metrics proposed for standard annual reporting in addition to those required by Circular A-11 instructions on annual reporting of technology transfer.**

<b>General TT Activities</b>	<b>CRADA-related</b>	<b>Invention / Patent-related</b>	<b>License-related</b>	<b>Partnership intermediary-related (ATIP)</b>
# plant varieties released	# of small business CRADA partners	# of jointly owned inventions / patents with universities	# of small business licenses	# companies reviewing inventions available for licensing
# of germplasm requests and amounts distributed	# of CRADAs modified with an expanded research plan (reflects a measure of satisfaction by private sector partner)	# of jointly owned inventions / patents with small entity owners	# joint inventions licensed to university co-owners	# CRADAs and licenses facilitated by PIA partners
# of Material Transfer Research Agreements (MTRA; new agreement)	# of personnel employed on CRADA research funds	# of Patent Cooperation Treaty applications filed	earned royalty income received from commercial sublicensees reported by university co-owners	# of transactions facilitated by ATIP member (includes entrepreneurship school engagements, tours of facilities, presentations to potential USDA partners, etc.)
Provide examples of significant technology transfer outcomes (transactions) that did not involve a patent and license	# of CRADAs by subcategory <ul style="list-style-type: none"> <li>• with private sector</li> <li>• with universities</li> <li>• with governments (state / federal)</li> <li>• with multiple parties</li> </ul>			

## **Strengthening Current Activities**

Generally speaking, ARS has invested a great deal of effort in strengthening and streamlining processes over the past many years. Existing policies on patenting and licensing significantly facilitate adoption of research outcomes by the private sector, especially small businesses. For example, licensing policies keep upfront costs low because licensing terms recover the fees of filing patent applications with the USPTO, but not legal costs of preparing patent applications. ARS has eight registered patent agents in house, and does not attempt to recover the salary costs of those who prepare and prosecute patent applications. In FY 2011, ARS reported 337 active licenses of USDA technologies, with 130 of these (39%) producing at least one product in the marketplace broadly available to the public. Yet, the median revenue from these licenses is only about \$5,000, illustrating the value of these public private partnerships in creating business opportunities at low transaction costs.

Licensing policies also promotes small business success with nominal licensing fees in the early years, but with annual maintenance fees and royalties that escalate in outyears, usually after sales of product have begun. Terms of sublicensing by the exclusive licensee also incentivize small-businesses, in that the licensee retains a substantial percentage of all fees and royalties arising from the sublicenses. This policy further enhances commercialization by encouraging broadest utilization of a federal invention. ARS also incentivizes scientists on the reporting of inventions, patenting, and licensing by providing 25% of the license revenues to inventors (statute requires 15%). Thus, there are policies in place that incentivize commercialization, minimize transaction costs, yet provide fair and equitable compensation for those who create federal innovations. Development of the ATIP network further enhances opportunities for the outcomes of scientists to be adopted, thereby documenting impact of their accomplishments which is used in evaluating promotions.

These are all parts of a robust and effective technology transfer program that consists of a variety of mechanisms and programs to complement the research conducted by the agencies. The technology transfer program must be clearly communicated to scientists in a *Policy and Procedures* document that describes responsibilities, opportunities, and processes to effect technology transfer. Accordingly, there are a number of proposed initiatives in this section designed to strengthen the existing technology transfer program.

### USDA 2: Update Policy and Procedure (P&P) 141.2 “Technology Transfer in ARS”.

An update is necessary to reflect statutory changes since 2000, and to reflect changes in structure and operation of Invention Disclosure Review Committees, licensing of biological materials, and use of intermediaries.

### USDA 3: Expand ATIP efforts to enhance access of complementary assets to partners of USDA.

- FY 2012 / 2013: Use of Salesforce (access provided by OTT) to enhance outreach with industry and better track outcomes
- FY 2013: Formalize relationships with entrepreneurship schools and curriculum at community colleges and 4-year colleges and universities; develop uniform process of introducing USDA technologies to class for business plan development, and access to mentors

- FY 2013: Propose partnership with FAS to seek international opportunities for ATIP clients commercializing USDA technologies
- FY 2013 and annually thereafter: Promote partnerships with other federal R&D agencies to create patent portfolio of related (complementary) technologies. This effort will be led by ATIP members having partnership intermediary agreements with other federal research agencies
- FY 2013: Engage ATIP members to survey CRADA and licensing partners of USDA as to effectiveness of programs, and to seek input for improving processes

Additionally, members provide the current or prospective private sector partners of ARS with access to business mentors, entrepreneur schools, and seed and venture funds. These will be reported in ATIP metrics annually and incorporated into this annual reporting.

### USDA 4: Expand outreach efforts of OTT to scientists and engineers in ARS.

- FY 2012 / 2013: Develop Fact sheets and quick sheets to raise recognition of responsibilities & opportunities for partnerships
- Develop series of training events organized by ARS National Program rather than general training by geographic area. This approach will result in more robust technology transfer approaches tailored to the agricultural industry sector served by the scope of the national program. For example, training to the scientists working on human nutrition and development of more nutritious foods will differ in partnership approaches from training of scientists working in water and soil management.

### USDA 5: Encourage other S&T agencies to adopt OTT's approach to technology transfer.

This will require leadership of the USDA Chief Scientist through her Council composed of the USDA science agencies. The result would be a "one USDA" approach to policies and procedures of technology transfer. Consequently, USDA would be able to provide more uniform nurtured relationships for common customers and stakeholders of agencies in USDA.

- Develop Policy and Procedure (P&P) guide for each participating agency for subsequent in depth training of scientists and engineers, line & program managers. ARS OTT has developed such a guide for APHIS Wildlife Services. This would become the model for other USDA S&T agencies.

### USDA 6: Explore expanded use of Enhanced Use Lease authority as technology transfer tool to promote longer term relationships with key customer groups.

Enhanced Use Lease (EUL) is an authorization that allows non-government entities to access and invest in underutilized federal facilities, and in exchange for their investment, can lease the facility for up to 30 to 50 years at fair market value. The length of the lease varies by specific congressional authorization. ARS currently has EUL pilot authority for only for the Beltsville Area. ARS developed a policy and procedure (P&P) for using EUL strictly as a technology transfer tool; no other agency with EUL authority (e.g., VA, DoD, NASA) has used it in this manner.

## **New Initiatives**

ATIP Partner, Maryland Technology Development Corporation (TEDCO) established the Rural Business Innovation Initiative (RBI<sup>2</sup>) program to enhance commercialization activities and provide technical and business assistance to small early-stage, technology-based companies in the rural areas of Maryland (as defined by the Rural Maryland Council). Through this program, TEDCO and USDA-ARS partnered to hold a number of regional events, called “Maryland Rural Agriculture and Business Innovation Forums.” The goal of these forums was to provide to rural farmers and businesses innovations and technology-based solutions to their regional agricultural problems.

The forum approach entailed several steps:

- (1) A series of regional listening sessions comprised of businessman, farmers, economic development, regulatory and extension personnel were held to identify a broad list of regional issues. This list included many issues, such as high-speed internet access, that did not have a research-based solution, yet would serve to identify additional needs that could be represented in the events.
- (2) From the list of rural issues, TEDCO and ARS selected those issues that were related to agriculture and had an existing research-based solution, or represented researchable issues that could be addressed by ARS.
- (3) ARS & TEDCO selected a smaller group from those that attended the first listening session for an in-depth discussion of the vetted list of rural issues.
- (4) Based upon the in-depth discussion, TEDCO & ARS selected topic areas for a one-day regional forum. ARS researchers, as well as research and extension personnel from nearby universities, and representatives from other agencies working in the topic areas were identified and invited to participate in the forum.
- (5) The forum was convened as a roundtable discussion to address the topic issues with farmers, agri-business professionals, university and ARS researchers, extension service personnel, rural development personnel, and funding and regulatory agency personnel.

### USDA 7: Beginning in FY 2012 / 2013, roll out a nationwide series of regional forums to identify issues and deliver solutions.

- These would be instituted by the ATIP members, beginning in FY 2012 in Ohio and Wisconsin;
- FY 2013 in Oklahoma, Louisiana;
- Add 2 ATIP members in their respective geographies to initiate the series each year
- Coordinate ATIP Forum and USDA S&T participating agencies to enhance public – private partnerships in both research and adoption of research outcomes
- Partner with other agencies: Rural Business Services (RD); NIFA Cooperative Extension Service; NIST Manufacturing Extension Partnership programs (MEP), etc.



USDA 8: Provide opportunities for applicants to the USDA Small Business Innovation Research (SBIR) program to partner with ARS scientists to further develop science necessary for business success.

This initiative would be operated jointly with NIFA, who manages the SBIR program for USDA. As currently proposed, this would include both funded and unfunded SBIR applications. SBIR applicants (post award announcements) would be provided with information on partnering with ARS, and would receive information from the ATIP Foundation and the ATIP member proximal to applicant to help facilitate partnering with ARS.

USDA 9: Provide CRADA partners opportunity to link to local MEP resources to assist in commercialization efforts

In partnership with NIST MEP, all CRADA partners of ARS would be provided local / regional MEP service provider for consultation on issues of scale up and product improvement.

USDA 10: Partner with the University of Mississippi's "Insight Park" for extraction, chemical analysis, and scale up of natural products for production agriculture and pest / pathogen / disease vector management

This initiative would directly address Section 4 of the Presidential Memorandum in establishing joint partnerships with university research parks, incubators, and other state / community economic development organizations. Similarly, such efforts could be piloted at ARS facilities should an expansion of EUL authority be granted to USDA. DoD's Armed Forces Pest Management Board, and the Office of National Programs, USDA ARS, have identified development of next generation insect repellents as the priority project.

USDA 11: Partner with the National Cancer Institute (NCI) on "Enhancing translation of nutrition science from bench to food supply"

At an escalating pace, scientific discovery reveals multiple approaches with the potential for exploration and eventual application to benefit society. At the same time, human, financial, and natural resources are severely constrained. This initiative is directed at developing public / private partnerships with the federal science agencies and food industry to translate research outcomes into the food supply. Joint USDA / NCI sponsored workshops are establishing the research priorities. A joint effort of the Office of Technology Transfer at NCI and USDA, proposed to be in collaboration with the Foundation for the National Institutes of Health (FNIH), the International Life Sciences Institute (ILSI) Research Foundation and the Agricultural Technology Innovation Partnership (ATIP) Foundation, can assist in cultivating relationships with the food industry toward the goal of creating healthier choices in the food supply – based on nutrition science – to advance public health and counter obesity.

USDA 12: Evaluate various options for reducing license negotiation transaction costs.

The Licensing Section is currently reviewing several proposals for establishing standard pre-commercialization license terms for all CRADA Subject Inventions. The possible benefits include:

- creating business certainty for CRADA partners;
- providing an additional incentive to enter into a CRADA with ARS; and
- reducing transaction costs for both the CRADA partner and ARS.

There are, however, some serious considerations to this proposal. For example, some inventions have much greater market potential than others and would therefore ordinarily command larger license fees. If standard terms are applied to all inventions regardless of the size of the potential market, then the standard payment amounts must necessarily be sufficiently low to be reasonable for smaller market opportunities. This may result in a reduction in license revenues over time. Because technology transfer is an unfunded mandate, ARS uses license revenues to help support technology transfer activities, including the payment of patent filing and maintenance costs, negotiation of CRADAs and other collaborative research instruments, training of scientists and engineers, etc. Consequently, a reduction in license revenues would negatively impact ARS technology transfer efforts broadly. Therefore, proposals for the establishment of standard pre-commercialization license terms for all CRADA Subject Inventions will be evaluated based on both effectiveness in reducing transaction costs and impact on projected future license revenues.

USDA #13: Develop Material Transfer Research Agreement (MTRA) as a new instrument to promote development and commercialization of materials from USDA.

USDA scientists create new materials that may have value in further research and development with the private sector. Current Material Transfer Agreements (MTA), widely used by USDA, only allow the transfer of materials, but not engagement in joint research between the provider and the recipient of the materials. This new agreement will serve as the authorization to conduct some joint research on the materials transferred. Because this instrument would not convey rights to negotiate exclusive licenses to any intellectual property arising from the research, it is intended as an early stage opportunity for proof of concept that may lead to more extensive research that would be conducted under a CRADA.



### Forest Service (FS)

<http://www.fs.fed.us/>

### Mission Statement

The overall mission of Forest Service (FS) is to “sustain the health, diversity, and productivity of the nation’s forests and grasslands to meet the needs of present and future generations.”

Established in 1905, FS is an agency of the U.S. Department of Agriculture that directly manages 193 million acres of public land in national forests and grasslands, and works with state forestry agencies and other partners to assist in managing 491 million acres of state and private forest lands. Gifford Pinchot, the first Chief of the Forest Service, summed up the mission of the Forest Service —“to provide the greatest amount of good for the greatest amount of people in the long run.” FS is comprised of four deputy areas, National Forest System (NFS), Research and Development (R&D), State and Private Forestry (S&PF), and Business Operations.

The R&D mission is to “develop and deliver knowledge and innovative technology to improve the health and use of the Nation’s forests and grasslands – both public and private.” R&D provides this information to landowners, managers, policymakers, and the American people to help inform their decisions and actions.

### Nature and Structure of Research Program

The FS R&D mission area develops and delivers the scientific information and technology needed to manage, protect, use, and sustain the natural resources of forests and rangelands. Research is conducted by over 550 scientists and several hundred technical and support staff. The FS R&D deputy area includes five research stations (Northern, Pacific Northwest, Pacific Southwest, Rocky Mountain, and Southern), the Forest Products Laboratory, the International Institute of Tropical Forestry in Puerto Rico, and two Technology and Development Centers run by NFS, one in Missoula, Montana and one in San Dimas, California.

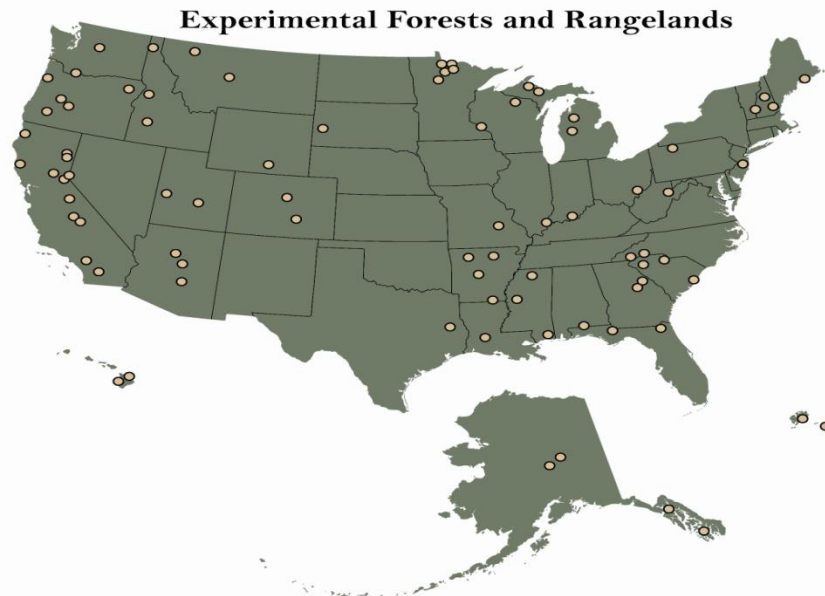
There are 92 research work units located at 67 sites throughout the United States. The system provides places for long-term science and management studies in major vegetation types of the 193 million acres of public land administered by the Forest Service.



The research program is organized among seven Strategic Program Areas: wildland fire and fuels; resource management and use; wildlife and fish; recreation; water and air; inventory monitoring and analysis; and invasive species.



FS R&D maintains a vital network of 80 Experimental Forests and Ranges, 29 of which were established in the 1930s. Long term records from some of these forests can provide unprecedented insights into global climate change, watershed function, disturbance recovery and many other areas. Major themes in research at the Experimental Forests and Ranges include: development of systems for managing and restoring forests, range lands, and watersheds; investigation of the workings of forest and stream ecosystems; characterizing plant and animal communities; observing and interpreting long-term environmental change and many other themes.



FS R&D is currently placing special emphasis in climate change, biomass to energy, watershed restoration, urban natural resource stewardship, and nanotechnology. FS R&D seeks to achieve excellence in conducting high-quality research on relevant topics in natural resource sciences.

### **Current Technology Transfer Goals, Objectives, and Measures of Success (Metrics)**

The FS uses many means of technology transfer, including: marketing efforts at tradeshow and with universities, patents, webinars, workshops and social media posts, conservation education and citizen science, public outreach, and publications both electronic and paper. Many metrics associated with these efforts are currently being tracked, and FS plans to track new metrics such as social media, web hits and citation indexes within the next five years.

One way that FS R&D currently measures the success of its technology transfer efforts is through the Customer Satisfaction Survey sent out every three years to the various people and groups who use our research information and products. The survey uses econometric models, developed collaboratively with FS R&D staff and customized for our products and services. The results are presented as a score based on the American Customer Satisfaction Index methodology, which enables users to make comparisons with the scores of other Federal R&D agencies. The three main components measured were relevant activities in each area that drive customer satisfaction, satisfaction itself, and desirable customer behaviors and outcomes. The FY 2009 survey scored 75, exceeding its target and scoring significantly better than the average for Federal agencies. Results from this survey were incorporated into FS R&D program planning to ensure that the work we do is relevant to customers' needs. The survey will be repeated in FY 2012.

The principal contact for technology transfer via patents and licensing within the FS is the Patent Program reporting to the Washington Office located at the Forest Products Laboratory in Madison, WI. The FS Patent Program receives and tracks all invention disclosures, providing guidance to scientists regarding all aspects of intellectual property protection. The Patent Program directs prior art searches and prepares FS invention disclosures for review by the FS

Patent Review Committee (PRC), a multidisciplinary committee with members from R&D, National Forest System, and State & Private Forestry. The Patent Program also oversees contract law firms drafting patent applications, and files and prosecutes applications in the United States Patent and Trademark Office. Draft patent licenses are prepared by the FS Patent Program and reviewed by ARS OTT Licensing Specialists. CRADAs and other technology transfer agreements for the FS are handled by the FS Grants and Agreements Specialists, with patent marketing responsibilities falling to the FS Patent Program.

The PRC is scheduled to meet bimonthly and their function is to evaluate and determine whether to file patent applications on FS invention disclosures. The criteria used by the committee include the invention's relationship to the overall mission of the Forest Service, its potential to further national forest resource goals and objectives, the advancement of the state of the art, and economic concerns such as market potential, costs of production, and licensability. Once the decision to patent has been made, the FS Patent Program handles filing and prosecuting patent applications, and/or working with the joint owner (CRADA cooperator, university, etc.) to pursue patent protection.

The Forest Service is the only land management agency within USDA and is responsible for 191million acres. Forest Service R&D provides high-quality scientific information and applications that help land managers restore and maintain healthy forests and grasslands for community protection; multiple environmental and social benefits, such as clean air and clean and abundant water; a great array of recreational opportunities; and a wide range of ecosystem services. The following table illustrates trends in FS R&D performance outcomes, the average of these years will be used as a baseline for the period from 2013-2017.

**Trends in Forest Service R&D performance outcomes.**

<b>Performance measure</b>	<b>FY 2008</b>	<b>FY 2009</b>	<b>FY 2010</b>	<b>FY 2011</b>
Customer satisfaction index score - (60,000 - 80,000 customers surveyed every three years)	72	75	75	75
Patent Applications filed	9	6	6	13 <sup>1</sup>
New Inventions Disclosed	31	36	18	31
Patents Granted	6	3	2	3
Patent Licenses Executed	1	0	0	2
CRADAs executed	7	5	6	5
Collection Agreements executed	117	114	107	15
New Interagency Agreements and Contracts	40	57	38	32
Interagency Agreements and Contracts	12	12	12	12
International Cooperative Agreements executed	0	1	3	21
Research Joint Venture Agreements executed	199	300	304	58
Number of invasive species tools developed, delivered, and used as an invasive species PART performance measure calculated as the number of invasive species tools on a 5-year rolling average	142	177	170	163
Articles Published in Journals	1,903	2,294	1,884	3,083
Articles Published in all Other Publications	1,487	921	993	1,178

FY = fiscal year

The average of FY 2008 – FY2011 will be the baseline for the 2013-2017 period.

<sup>1</sup> Note: A total of 13 patent applications were filed In FY 2011, 9 provisional and 4 utility applications.

## **Strengthening Current Activities**

USDA 14: Accountability of Scientists and Engineers in Technology Transfer Accomplishments. Starting in FY 2012, scientist's annual performance standards for evaluation have been revised to include science delivery and technology transfer. Scientists will now need to document in their performance reviews additional work beyond publishing to accomplish effective technology transfer and science applications. To be "Fully Successful" under the "Mission Results" element, both careful planning and actual delivery of technology transfer and science application activities will need to be demonstrated.

## USDA 15: New uniform metrics for Forest Service Outcomes.

The following metrics are currently being tracked non-uniformly by a number of the FS Research Stations. One of our goals is to standardize metrics tracking at each station in the following areas:

- Agreements (Material Transfer, Confidentiality, Joint Venture, and other agreements, in addition to Cooperative Research and Development Agreements (CRADAs) which are currently counted)
- Videos and podcasts
- Tweets
- Website visitors
- Website downloads
- Workshops and webinars
- Newsletters and station magazines (electronic and hard copy distribution)
- Peer reviewed publications and publication downloads
- Trade journal publications
- Field days, open houses and tours

Beginning in FY 2013, FS plans to track new metrics, such as oral presentations of research results and posters at meetings, workshops, technical conferences, working committees of scientific professional organizations, articles in applied science outlets, trade journals, interest-group magazines, and e-media whose readership is heavily composed of the targeted audiences, direct communication with potential research users, including both intermediaries (e.g., extension foresters and consultants) and end-users via direct in-person interactions or by electronic means (e.g., Webinars, Web sites), conducting field tours for student groups or visiting professionals, participating at science fairs, mentoring students interested in science careers, etc.

A new "Science Delivery Award" under the Deputy Chief for R&D awards system has been created and the first selection for this award was made in January, 2012. The first recipient was selected for playing a critical role in making scientific models available for fire management applications in the form of fire behavior prediction and fire danger rating systems.

The Patent Program website has recently been updated and includes a current listing of patented FS technologies available for licensing. Patent Program staff is currently working with FS Office of Communications to showcase key patents on the National R&D website, with further revisions underway. Also, an RSS feed of available technologies has been posted on the Federal Laboratory Consortium (FLC) website, which is another way for FS patented technologies to gain more national exposure.

In 2011, the FS and its partners released a new version of their free software, i-Tree v.4, which provides urban planners, forest managers, environmental advocates, and students a tool to measure the ecological and economic value of the trees in their neighborhoods and cities. The i-Tree suite of tools has helped communities of all sizes gain funding for urban forest management and programs by quantifying the value of their trees and the environmental services trees provide. i-Tree v.4 will reach a broader audience in educating people on the value of trees. It is easy for homeowners, garden centers and school classrooms to use; and easier and less expensive for communities and managers to analyze the extent and value of their tree canopies, analyses that up to this point have been prohibitively expensive for many communities. i-Tree Hydro provides a more sophisticated tool for professionals involved in stormwater and water quality and quantity management. It helps communities evaluate and address the effects of their urban forests on stream flow and water quality, helpful in meeting State and National clean water and stormwater regulations and standards.

In 2011, the FS elevated the agroforestry program to build on significant science and technology advances made in the past 20 years due to R&D and S&PF investments in the USDA National Agroforestry Center (NAC) and the work of NAC's national network of partners. As part of the new interagency agroforestry team, R&D will play a key role in developing and delivering the science that helps landowners utilize agroforestry for both its economic and conservation benefits. Agroforestry practices include riparian forest buffers along waterways; alley cropping which integrates crops, such as grains or vegetables, in alley ways with high-value trees and shrubs; forest farming where non-timber forest products such as food, herbals, botanicals, and decorative products are grown under the protection of a managed forest canopy; and field, farmstead, and livestock windbreaks.

### **New Initiatives**

The FS Patent Program has undertaken an additional marketing effort by attending two fastener industry trade shows to market a Forest Products Laboratory (FPL) fastener technology that calculates the surface area of a threaded fastener. Booths presenting this technology were staffed by the inventors and Patent Program personnel to generate interest in the technology. This resulted in key contacts being made within the industry that enabled several articles to be published in national and international journals, a speaking engagement for one of the scientists at a trade group meeting, and an award for being one of the top new products in 2011 as recognized by Fastener Technology International. Going forward, the FS Patent Program plans to continue to devote resources toward marketing efforts of this nature in order to increase awareness of FS inventions and promote adaption of these technologies outside of the FS. In addition, future marketing efforts will focus on recently filed patent applications, with the hope of finding commercialization partners earlier in the process.



### USDA 16: New metrics on research outcomes related to intellectual property (patents).

FS R&D developed and implemented the Research Information Tracking System (RITS), which became the official FS reporting vehicle for all science publications in FY 2010. RITS improves the quality and consistency of data, provides transparency to the public, and reduces the need for burdensome data calls. Metrics now available in RITS will be tracked in the USDA Annual Report beginning in FY 2012. In testing now, the next version of RITS will incorporate patent data which will be connected to related publications on specific technology focus areas.

Citation analysis is the analysis of data derived from references cited in footnotes or bibliographies of scholarly publications. The basic assumption behind citation analysis is that influential research or scientists are cited more often than others, thus reflecting the relative effect and utility of a work. Over the 10-year period from FY 2002 through FY 2011, FS publications were cited in formally peer-reviewed publications almost 85,000 times, with more than 14,000 in FY 2011. The average number of FS publications cited 20 or more times and 50 or more times were 1,152 and 286 respectively, as reported in Web of Science. FS patents have been cited 1,100 times since 1982. Beginning in FY 2012, patent citations will be updated annually through the use of our RITS database.

This past year Forest Service R&D made the *Research Data Archive* (<http://www.fs.usda.gov/rds/archive>) available on the Internet and added an additional 50 research data sets in FY 2011. To improve long-term management of research data collected on Experimental Forests & Ranges (EFRs), the archive provided metadata training for scientists and EFR data managers. The archive also entered into an agreement to provide a number of services to the *Joint Fire Science Program* (<http://www.firescience.gov>) including training webinars for JFSP grant applicants; reviewing data management plans for grant proposals; providing metadata catalog services for all JFSP research projects; and serving as the recommended data repository for JFSP research projects.

### **Facilitating Adoption Through Partnerships**

As part of the USDA, the Forest Service Patent Program has enjoyed a close working relationship with ARS and the Office of Technology Transfer (OTT) for many years. This partnership has grown and expanded to include FS access to the Agriculture Research Information System (ARIS) database for patent and license tracking, inclusion in OTT teleconferences, and ARS Licensing Associates assisting the FS Patent Program with license negotiations.



### USDA 17: Explore additional ways FS and ARS work together on intellectual property and related matters.

CRADA's are widely used within the FS. They enable researchers to work with university partners and industry leaders alike and are drafted by the FS Grants and Agreements Specialists. Recognizing efficiencies that could be gained by having standardized agreement language and procedures, FS hopes to use ARS as a CRADA resource to assist with CRADA questions. For example, FS proposes using the ARS Partnership Liaison to conduct a training session or webinar on CRADAs for all of the FS Grants & Agreements Specialists.

Currently the FS has an informal "Partnership Intermediary Authority" (PIA) like relationship with the Wisconsin Security Research Consortium (WSRC). ARS is offering to expand their PIA Agreements to enable access for other USDA agencies, subject to their contributions to support Office of Technology Transfer operations. The Staff Director for Science Quality Services attended the March, 2012 Agricultural Technology Innovation Partnership (ATIP) meeting to help further this relationship. FS would benefit from the opportunity to work more closely with ATIP, with the hope of finding industry partners to collaborate with FS scientists and license their technologies.

### USDA 18: Enhance education and extension outreach efforts.

FS R&D has a focused effort to educate children about conservation of natural resources and ecology. For example, FS R&D, in cooperation with University of Georgia, created a web-based conservation education program tool called EUGENE (Ecological Understanding as a Guideline for Evaluation of Non-formal Education) based on ecological principles. Educators can use this on-line tool to measure students' gain in knowledge of ecological principles after exposure to the program. Metrics related to this effort that are currently tracked, or will be tracked, include number of downloads of course materials, number of Natural Inquirers downloaded and mailed in printed form, number of teachers using FS developed educational materials, and cooperative agreements and other efforts with related groups, such as the Cradle of Forestry.

Similar to state Extension services provided by many universities, the Forest Products Laboratory's (FPL's) Technology Marketing Unit (TMU) provides a broad scope of expertise in wood products utilization, marketing, technology transfer, and technical assistance. The TMU is part of the U.S. Forest Service's S&PF and collaborates with many different partners, particularly the FS R&D staff and state forestry agencies. In promoting the efficient, sustainable use of wood, the TMU assists private businesses, local governments, and rural communities by transferring wood-based technologies developed by the FPL, other FS research stations, universities, and other Federal research laboratories. The TMU supports the national and international mission of the FS in forest products utilization by ensuring ready adoption of forest-based material technologies to many small, rural forest product businesses. The breadth of TMU's work includes forest products conservation, processing, manufacturing efficiency, marketing, recycling, and bioenergy. Technical assistance efforts include publications, technical assistance visits, conferences, workshops, meetings, as well as individual consultations. The TMU manages and awards over \$5 million each year in grants dedicated to helping improve the utilization of woody biomass removed from forest restoration projects.

USDA 19: Enhance FS interactions with entrepreneurship activities at educational institutions. In FY 2012 the FS Patent Program formed a new partnership with the University of Wisconsin Madison Law & Entrepreneurship Clinic at the UW Law School. Through this connection the Patent Program is working with the “Strategic Management in the Life and Engineering Sciences” graduate class during the 2012 spring semester to evaluate the commercial potential of several FS technologies. The Patent Program hopes to continue to strengthen and further refine this connection in upcoming semesters, expanding involvement to include having a FS technology selected for VentureLab Wisconsin, a five-day, highly experiential and immersive program designed to assist early stage entrepreneurs with preparations to take technology products to market.

Through the FS Patent Program’s work with WSRC, they are now connected to the Center for Innovation and Business Development and the Small Business Development Center at UW-Whitewater. For the last three semesters, the FS Patent Program has worked with undergraduate business students enrolled in the “Consulting for Entrepreneurial Companies” course developing marketing plans for FS technologies. Beginning in FY 2012 increased follow-up with inventors is planned to further market the technologies following recommendations in the students’ reports, including attendance at trade shows and other non-traditional settings.

Working with WSRC, the FS Patent Program is in the process of establishing a connection at one or more of the engineering schools in Wisconsin with the hope of redesigning the FS ADA accessible water pump for use in third world countries. Beginning in FY 2013, FS plans to expand this partnership to include work on additional FS technologies that could use improved design for manufacturing efficiencies and for mass production.

**Animal and Plant Health Inspection Service (APHIS)**

<http://www.aphis.usda.gov/>

**Definition of Technology Transfer within APHIS and how Technology Transfer Activities Support the Agency's Mission**

The mission of the Animal and Plant Health Inspection Service (APHIS) is to protect the health and value of American agriculture and natural resources. APHIS is a multi-faceted Agency and this broad mission includes protecting and promoting U.S. agricultural health, regulating genetically engineered organisms, administering the Animal Welfare Act, and carrying out wildlife damage management activities. These efforts support the overall mission of USDA, which is to protect and promote food, agriculture, natural resources and related issues.

**WILDLIFE SERVICES**

[http://www.aphis.usda.gov/wildlife\\_damage/nwrc/](http://www.aphis.usda.gov/wildlife_damage/nwrc/)

**Mission Statement**

The mission of USDA APHIS Wildlife Services (WS) is to provide Federal leadership and expertise to resolve wildlife conflicts to allow people and wildlife to coexist. Wildlife is an important public resource greatly valued by the American people. However, wildlife is a dynamic and mobile resource that can damage agricultural and industrial resources, pose risks to human health and safety, and affect other natural resources. The WS program carries out the Federal responsibility for helping to solve problems that occur when human activity and wildlife are in conflict with one another. The WS program strives to develop and use wildlife damage management strategies that are biologically sound, environmentally safe, and socially acceptable.

**Nature and Structure of Research Program**

WS conducts program delivery through its Regional and State Offices and National Programs, providing high quality wildlife damage management services for its customers that result in the protection of agriculture, wildlife and other natural resources, property, and human health and safety. The National Wildlife Research Center is the research arm of Wildlife Services and is the federal institution devoted to resolving problems caused by the interaction of wild animals and society. The Center applies scientific expertise to the development of practical methods to resolve these problems and to maintain the quality of the environments shared with wildlife.

NWRC is headquartered on the Foothills Research Campus of Colorado State University (CSU) in Fort Collins, CO. Approximately two-thirds of NWRC's 150-person staff is located in Fort Collins; the remainder of the highly specialized staff are located throughout the United States, and address regional wildlife damage management issues. Further, NWRC routinely conducts international consultancies in this specialized area.

WS also continuously improves and modifies wildlife damage management strategies through research at its National Wildlife Research Center (NWRC) and Field Stations, developing methods that are biologically, environmentally, and socially sound. Emerging technologies and

improved knowledge of wildlife behavior and human values lead to new strategies for resolving wildlife damage problems. NWRC develops effective wildlife damage management methods through contributions in the following areas: Damage assessment; Investigation of the biology and behavior of problem animals; Evaluation of the impact of management practices on wildlife and the environment; Development and improvement of present management technologies; Investigation of potential applications of new management technologies; Support of registration of chemicals and drugs used to manage wildlife; Transfer of scientific and technical information; Provision of scientific guidelines on wildlife damage for use by regulatory agencies; Development of cooperative research and training with other organizations; and Responsiveness to needs of user groups and the public;

The Center employs more than 150 scientists, technicians, and support personnel at its Fort Collins, CO, headquarters and at field stations in several other states. Scientific staff specializes in several disciplines including animal behavior/psychology, chemistry, biology / ecology / zoology, economics, genetics, immunology, pharmacology/toxicology, physiology, wildlife biology, and wildlife disease. The Center relies on the services of people with additional specialties through cooperative ties with universities, not-for-profit research facilities, and other public and private research entities.

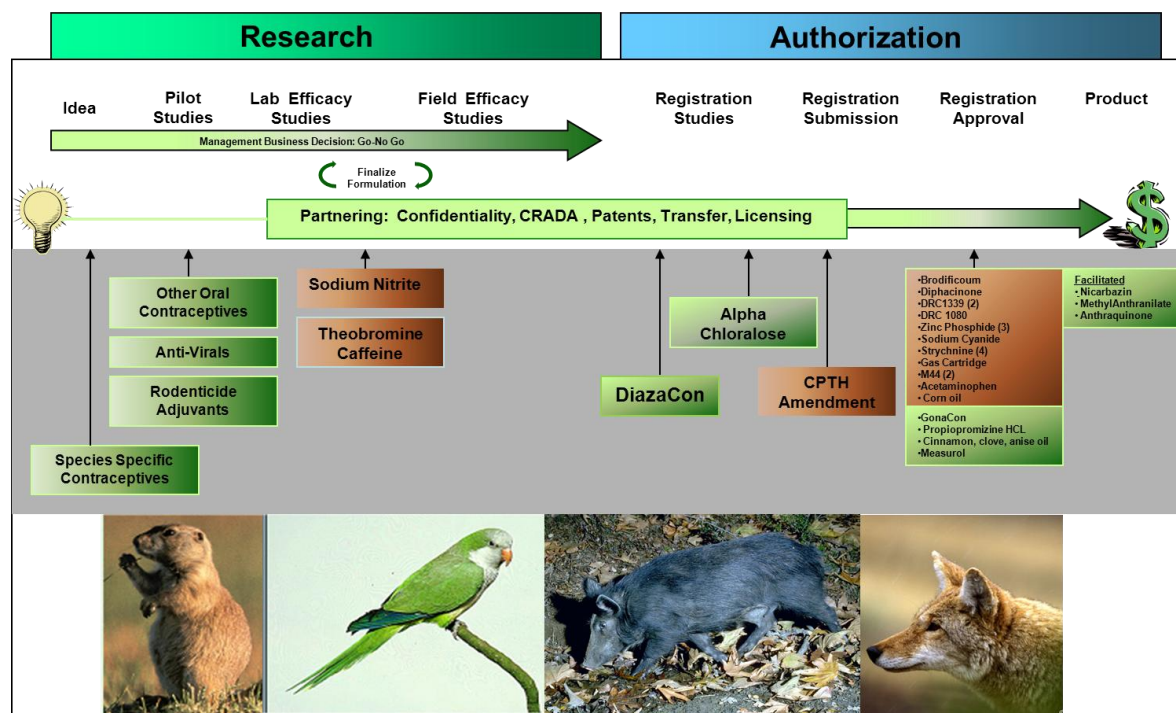
### **Current Technology Transfer Goals, Objectives, and Measures of Success**

NWRC scientists produce the appropriate methods, technology, and materials for reducing animal damage. Through the publication of results and the exchange of technical information, the Center provides valuable data and expertise to the public and the scientific community, as well as to APHIS's Wildlife Services (WS) program.

Wildlife Services follows the general USDA definition of technology transfer as the adoption of research outcomes (i.e., solutions) for public benefit. These innovations from WS research, through public / private partnerships, create new or improved technologies, processes, products and services that benefit the nation by increasing productivity, increasing efficiency (keeping costs low) and enhancing global competitiveness for the U.S. agricultural sector. Technology transfer is critical to accelerating use of public research and methods development, creating economic activity, creating jobs, and sustaining economic development. WS uses formal instruments of technology transfer, including material transfer agreements and Cooperative Research and Development Agreements (CRADAs). In addition, WS transfers technology through patents and invention licenses for commercialization by the private sector. Wildlife Services has an ongoing formal agreement with ARS Office of Technology Transfer to administer WS patents and licensing; ARS' annual report therefore includes technology transfer activities and metrics for the Animal and Plant Health Inspection Service's Wildlife Services (APHIS-WS), including tabular metrics of inventions, licenses, and Cooperative Research and Development Agreements, as well as a section on notable "downstream outcomes." For APHIS-WS, invention disclosures are evaluated within ARS patent review committees that are expanded to include three APHIS-WS members. ARS committee recommendations for APHIS-WS inventions are made to the Director of the APHIS National Wildlife Research Center in Ft. Collins. ARS Patent Advisors prepare, file, and prosecute WS inventions on behalf of APHIS, and coordinate patent application filings in other countries through a contractor.

In addition to patents and licenses, WS/NWRC transfers knowledge and technology through many other formal and informal mechanisms. Primary among these methods is publication in peer-reviewed scientific journals. Other important mechanisms for transferring technology and knowledge include presentations at technical or professional conferences and publications in proceedings, technical assistance to the public or stakeholders, informal and formal exchange of information and products among colleagues, and laboratory open houses. Formal agreements, including cooperative agreements, cooperative service agreements, material transfer agreements, and confidentiality agreements are used to formalize collaborations with other government scientists, universities, private companies and other stakeholders.

The schematic below depicts one additional method by which Wildlife Services supports the Agency mission through its technology transfer activities. APHIS/Wildlife Services has a dedicated staff devoted to registration / authorization of products with regulatory agencies, including the Environmental Protection Agency, the Food and Drug Administration and the USDA Center for Veterinary Medicine. When products are developed, they proceed through the research and development pipeline shown in the schematic, are registered with the appropriate regulatory agencies, and are typically produced for sale by a private company. In the past, the majority of methods and products have not been licensed, but efforts are currently being made by WS to increase the number of patents and licenses for WS products (e.g., co-hosting regional technology transfer fairs, enhancing training for NWRC scientists in technology transfer, and developing a technology transfer brochure for the NWRC, and beginning engagement with the ATIP network).



Wildlife Services currently measures success of its technology transfer using several metrics. To measure the success with which its scientists are partnering with collaborators, the NWRC looks



at the number of agreements established with collaborators. These include confidentiality agreements, material transfer agreements and CRADAs established with partners. However, because many of our partnerships do not necessarily involve the transfer of intellectual property, NWRC also follows the number of other agreements established, including cooperative agreements, cooperative service agreements, and interagency agreements, all of which measure the degree of collaboration that NWRC has with universities, businesses, other federal government agencies, state and local governments, non-governmental organizations, and foreign governments and universities. Cooperator funding is very important to Wildlife Services and the NWRC in accomplishing its mission, with an effort being made to increase the amount of cooperator funding generated. For example, cooperator funding at NWRC averages about 10% of the annual budget, generating \$1.6 million in 2010, \$1.4 million in 2011 and \$2.0 million in 2012. Other federal agencies make up ~75% of cooperator funding, while 25% is derived through research agreements with other collaborators.

The NWRC tracks its outreach and communication efforts through numbers of technical publications. NWRC has a full-time legislative and public affairs staff person and is increasing its outreach efforts through press releases, stakeholder announcements, fact sheets, website postings, facility tours, and workshops. One area we have begun to emphasize is outreach to the business community and communication to Wildlife Services operations and stakeholders regarding the economic value received for their research investment. The NWRC also tracks the number of registrations (existing and new) that have been obtained with regulatory agencies. This is an indicator of new product development that has been provided for use by the public or by Wildlife Services operational staff.

**Development plan for new technology transfer initiatives to be undertaken or existing technology activities to be strengthened****\*Strengthening Current Activities****\*\*New Initiatives****USDA 20: Increase awareness in WS of technology transfer mechanisms, leading to increased pace of effective technology transfer and commercialization**

	Objective	Activity	Performance Metrics
1*	Increase awareness and participation in technology transfer activities by NWRC scientists	Provide technology transfer training	% of scientists having completed TT training  Number of scientists with at least one TT agreement
2**	Increase awareness and participation in technology transfer activities by non-federal partners	Initiate outreach activities, such as workshops / TT fairs for private industry	Number of contacts/transactions developed from workshops
3*	Increase number of agreements with stakeholders, including CRADAs	Provide incentives for stakeholder collaboration through research awards, etc.	Number of agreements; examples of research outcomes adopted by end users (also see ARS metrics)

**USDA 21: Increase knowledge of WS and NWRC and their impact in preventing wildlife conflicts, leading to increased development of collaborative research and more effective use of public resources**

	Objective	Activity	Performance Metrics
1*	Increase information on economic or other value received for research investment	Produce analyses of economic or other benefits of WS or NWRC operations or research	Dollars saved by programs
2*	Increase communications to stakeholders	Develop communication strategies and products for dissemination	Number of communications to stakeholders
3**	Develop internal partnerships within APHIS	APHIS Wildlife Disease working group	Number of collaborations in high priority areas

**USDA 22: Increase the pace of WS technology transfer and commercialization activities**

	Objective	Activity	Performance Metrics
1**	Obtain partners for technologies ready to be commercialized	Work with ARS to use the ATIP Program	Number of partnerships developed
2*	Maintain existing products and register new products	Provide registration data/information to regulatory agencies	Number of registered products

For both “USDA 21” and “USDA 22”, ATIP members will be enlisted to survey CRADA and licensing partners of USDA as to effectiveness of programs, and to seek input for improving processes.

***VETERINARY SERVICES (VS)***

[http://www.aphis.usda.gov/animal\\_health/index.shtml](http://www.aphis.usda.gov/animal_health/index.shtml)

**Mission Statement**

As the recognized animal health leader and trusted partner, Veterinary Services safeguards the health of animals, people, and the environment. VS’s authorities derive from the Animal Health Protection Act and the Virus Serum Toxin Act. VS integrates One Health principles with USDA business objectives by contributing leadership, expertise, infrastructure, networks, and systems to collaborate effectively with local, State, Tribal, national, and international partners. Its comprehensive and integrated on-farm surveillance activities provide VS the capability to achieve national goals for animal disease prevention, detection, and early response.

**Nature and Structure of Program**

VS is organized into policy and permitting staffs, a field force, and three science centers, described below:



***The National Veterinary Services Laboratories (NVSL)***

**Mission:** The mission of NVSL is to safeguard U.S. animal health and contribute to public health by ensuring that timely and accurate diagnostic laboratory support is provided directly or by its coordination of the nationwide animal-health diagnostic system. NVSL accomplishes its mission through:

- Performing diagnostic laboratory testing for Veterinary Services' program disease and for suspected outbreaks of foreign animal diseases
- Serving as the U.S. national and international reference laboratory for animal disease diagnosis by providing unique veterinary diagnostic capabilities, providing other diagnostic laboratories with animal disease information, technical guidance, reagents and reference materials;
- Providing national leadership in coordination of the National Animal Health Laboratory Network (NAHLN) and emergency laboratory response by training State, University and foreign laboratory personnel, providing proficiency testing, and developing improved diagnostic technologies;
- Preparing for responding to animal health emergencies and emerging threats to animal agriculture including threats to the poultry and aquaculture industries by being able to conduct and/or support diagnostic testing in an outbreak environment

Among other potential TT activities, NVSL develops and validates assays, and manufactures and distributes over 500 biological reagents to support veterinary diagnostics, many of which are not available from any other source.

Before a test is utilized by Veterinary Services for disease control or surveillance, it must be validated for that purpose. Samples for test validation for program diseases such as brucellosis and tuberculosis are in serum and tissue banks generated and maintained at the NVSL. These samples are made available to commercial kit manufacturers for their initial validation, and additional test validation is conducted at the NVSL before the results are submitted to the USAHA Scientific Advisory Committees. This is in addition to any testing for licensure required by the Center for Veterinary Biologics.

The NVSL is also involved in the development and validation of assays used to detect diseases that are foreign to the United States. Some of these assays are utilized in the reference laboratory as confirmatory tests, while others are deployed to the NAHLN laboratories and utilized in surveillance programs. Identification, feasibility testing, development, optimization and validation of new assays and/or technologies are all accomplished within the NVSL. The NVSL staff collaborates with, and provides scientific advice to other Federal and State Government agencies that are also developing new assays and technologies, and NVSL scientists partner with other reference laboratories around the world to obtain diagnostic specimens from naturally infected animals. These collaborative efforts result in enhanced expertise at the NVSL and in reference collections that are available for assay development and validation.

***Centers for Epidemiology and Animal Health (CEAH)***

**Mission:** With a view to the future, The Centers for Epidemiology and Animal Health (CEAH) explore and analyze animal health and related agricultural issues to facilitate informed decision-

making in government and industry. CEAH also partners with the World Organization of Animal Health (OIE) and its member countries to improve international disease surveillance capabilities and analytic methods supporting trade decisions. CEAH has a multidisciplinary staff that includes agricultural economists, spatial analysts, GIS and computer specialists, veterinary epidemiologists, technical writers/editors, and data managers.

CEAH collaborates with university partners on analysis methods and tools. In some cases the products produced are commercialized by the academic partners.

### ***Center for Veterinary Biologics (CVB)***

**Mission:** The Veterinary Biologics Program (CVB) implements the provisions of the Virus-Serum-Toxin Act (VST) to assure that pure, safe, potent and effective veterinary biologics are available for the diagnosis, prevention, and treatment of animal diseases. This mission mandates the use of sound scientific technology to:

- Ensure that biologics are free of disease producing agents, especially foreign animal diseases
- Develop appropriate standards and procedures for product release
- Issue licenses and permits
- Monitor and inspect products and facilities
- Control field tests and release of veterinary biologics

CVB-developed methods and biological standards are applied equally to all products, but by the same token can be adopted whole by the regulated commercial manufacturers, becoming part of their manufacturing and release process.

### ***PLANT PROTECTION AND QUARANTINE***

[http://www.aphis.usda.gov/plant\\_health/index.shtml](http://www.aphis.usda.gov/plant_health/index.shtml)

### **Mission Statement**

PPQ safeguards agriculture and natural resources from the entry, establishment, and spread of animal and plant pests and noxious weeds into the United States of America; and supports trade and exports of U.S. agricultural products.

### **Nature and Structure of PPQ's Methods and Technology Development Program**

PPQ's technology development is centered with its Center for Plant Health Science and Technology (CPHST). CPHST is responsible for ensuring that PPQ has the information, tools and technology to make the most scientifically valid regulatory and policy decisions possible. In addition, CPHST ensures PPQ's operations have the most scientifically viable and practical tools for pest exclusion, detection, and management. CPHST's services and products support PPQ and cooperator programs, strengthen regulatory actions, and enhance policy development.

CPHST is headquartered on the campus of North Carolina State University in Raleigh, North Carolina. The broader CPHST system however consists of approximately 250 employees in 7 labs, 4 units, and several work stations throughout the United States. CPHST supports

regulatory plant protection activities by developing methods and conducting analyses in the following areas:

- Plant pest risk analysis
- Commodity treatment technology
- Pest detection
- Pest identification
- Diagnostic methods
- Pest management methods
- Biological control

CPHST activities are primarily focused on supporting PPQ needs, but also support stakeholders such as State plant regulatory programs and the agricultural and nursery industry. As well as conducting work internally, CPHST works with cooperators in other agencies (i.e. ARS, Forest Service), academia, and industry to develop methods needed for plant protection and management of invasive pests.

### **Current Technology Transfer Goals, Objectives, and Measures of Success**

PPQ transfers new methods and technology through several mechanisms. Technical reports are distributed directly to stakeholders or are made available through the PPQ website. Another important mechanism is through the publication of results in peer-reviewed journals. CPHST also provides technical training and accreditation to stakeholders in certain areas. For example, the CPHST Beltsville Lab provides hands-on training on newly developed molecular diagnostics for regulated plant diseases and accredits state and academic laboratory staff to perform specific diagnostics.

Other important mechanisms for transferring technology and knowledge include presentations at technical or professional conferences and publications in proceedings and technical assistance to public or stakeholders. Formal agreements, including cooperative agreements and memoranda of understanding are used to formalize collaborations with other government scientists, universities, private companies and other stakeholders.

PPQ is also authorized by the Stevenson-Wydler Act of 1980 to engage in formalized technology transfer activities with its cooperators. In carrying out its methods development projects, the statute allows the directors of any federally funded research and development center (our laboratories) to enter into cooperative research and development agreements (CRADA's) with any person, any agency or instrumentality of the United States, any unit of State or local government, and any other entity specified in the statute.

PPQ also enters into confidentiality agreements with entities when necessary to allow for appropriate protection of confidential business information, thus facilitating technology transfer information exchange.

Additionally, PPQ is in the process of establishing a Technology Transfer Coordinator to further help identify technology transfer needs and opportunities, and to ensure for a good linkage between its technology development laboratories and end-users.

### **Strengthening Current Activities**

#### **USDA 23: Enhance Collaboration Efforts in Pest Detection and Management**

PPQ's scientific support focuses on improving and developing pest detection and management tools to discover new invasive species early and respond quickly, better identify and target offshore pest threats, develop diagnostic tools and techniques, and transfer technology to cooperators and impacted industries.

Objective - Enhance the Understanding of Potential Threats: Collaboration, cooperation and participation between PPQ and domestic and foreign plant health communities result in information transfer and project cooperation and participation.

Objective - Make Technically Accurate Diagnostic Tools Widely Available on a Timely Basis: PPQ leverages partnerships with academic institutions, state and federal agencies, industry, and international partners to share data, transfer technology, and ensure PPQ and cooperators are provided with the most current and robust diagnostic tools. Strategies include:

- Develop infrastructure to provide technical advice and support to facilitate the technology transfer of methods involving standardized surveys and operational diagnostics standard operating procedures (SOPs); work instructions; and on-site hands-on training for PPQ and collaborating labs in the use of survey, detection and identification protocols for high consequence plant pests and pathogens.
- Enhance the technology transfer process to ensure transparency and effective use of the provided tools.
- Work with the Plant Germplasm Quarantine Program and its cooperators to identify methods to be validated to screen germplasm for targeted pests; work cooperatively with programs to transfer these methods into operations.

Objective - Make Appropriate and Technically Sound Survey Methods Widely Available on a Timely Basis: PPQ science support provides survey methods and techniques that are practical and feasible for the end-user.

Objective - Provide New Technologies for Existing and New Programs: PPQ stays abreast of cutting-edge technology developments by maintaining partnerships with industry, academia, state and federal agencies, international entities, and PPQ program personnel and transfers these technologies to cooperators and industry impacted by plant pests.

#### **USDA 24: Provide Timely Scientific and Technical Support for Emergency Response and Management**

PPQ must develop and maintain a high level of expertise to support preparedness in the areas of science, technical support, and technology transfer for rapid response efforts.

Objective - Ensure CPHST Resources and Tools Meet PPQ's Emergency Response Needs: Resources and tools must be accessible to collect information, analyze and respond to plant

health and all-hazard emergencies. CPHST must be able to effectively communicate and deploy the appropriate tools to support PPQ in emergencies. CPHST must establish partnerships with external collaborators to coordinate Technical Working Groups that analyze scientific information and data in support of emergency response. Strategies include:

Imbed scientists in pest programs beyond the Science Advisory Panel capacity on an ongoing basis to learn from and consult with PPQ operations in plant health and all-hazard emergencies.

### **USDA 25: Improve Communications between CPHST and its Customers to assure Market Relevance**

CPHST aims to establish and maintain an effective dialogue with its customers to ensure development activities are useful and applicable to customer needs.

Objective - Improve CPHST Knowledge and Understanding of Customers: Scientists must understand the customer and circumstance to provide appropriate deliverables. Strategies include:

- Place scientists responsible for tool development in the field to ensure effective tech transfer and learn more about implementation under field conditions and environment.
- Hold periodic reviews with customers to discuss ongoing projects and identify new needs and requirements.

### **USDA 26: Improve the CPHST Work Plan Development and Project Prioritization Process to Assure High Quality Outcomes for Customers / Stakeholders**

CPHST will continue to develop a process with PPQ operations to produce mutually acceptable workplans that ensure appropriate product quality.

Objective - Deliver Quality Products that Are Acceptable to the Customer and CPHST Scientist: CPHST strives to deliver quality products that are acceptable and utilized by the customer. CPHST will accomplish this objective by the customer and scientist agreeing on the product quality-level and building quality-control mechanisms into the projects. CPHST scientists will work closely with their customers to ensure the end-user is prepared to use the product appropriately and effectively, and will routinely review and evaluate products after they are delivered and used by the customers. Strategies include:

- Establish a work group of PPQ operations staff and CPHST personnel to develop a process that details workplans for priority projects. The work group is charged with considering all elements of the process starting with the request-for-work through identifying and selecting priority projects
- Elements of workplans should be defined to include:
  - Project scope: Define project needs and required effort levels
  - Clearly identified project champion at the appropriate level of PPQ organization to ensure engagement and investment in project
  - Identify end-user of deliverable(s)
  - Clarify roles and responsibilities through the project's life
  - Establish an acceptable quality level that meets operational needs

- Resource allocation
- Realistic total project cost
- Technology transfer costs, timelines, milestones and deadlines
- Technology transfer strategy: CPHST transfers the technology to the operational programs and then assumes an advisory role to focus on next priority issue. The customer and CPHST scientist meet to discuss and mutually agree on the final product's specific deliverables and acceptable quality level, balancing political realities and field conditions where the product is to be used and the standards for scientific integrity of the product
- Craft Quality Control (QC) mechanisms into the project to ensure delivery of the product's agreed quality level
- Ensure the technology transfer component of the project adequately prepares the customer to use the product appropriately and effectively
- Develop and implement a process to routinely review and evaluate products after delivered to and used by the customer
- Fix or refine products based on reviews and evaluations of the product.

### ***BIOTECHNOLOGY REGULATORY SERVICES***

<http://www.aphis.usda.gov/biotechnology/index.shtml>

#### **Mission Statement**

The mission of Biotechnology Regulatory Services (BRS) is to protect and enhance U.S. agricultural and natural resources using a dynamic, science-based regulatory framework to ensure the safe importation, interstate movement, and environmental release of GE organisms.

#### **Nature and Structure of Program**

BRS does not perform research. BRS regulates the introduction (importation, interstate movement, and release into the environment) of genetically engineered organisms that may pose a risk to plant health. Researchers and product developers, Federal or private, should understand and work with the appropriate regulatory agencies that may have oversight of an organism at different stages in the development of a product. This can facilitate efficient development of the appropriate information necessary for regulatory review.

## ***INTERNATIONAL SERVICES***

[http://www.aphis.usda.gov/international\\_safeguarding/index.shtml](http://www.aphis.usda.gov/international_safeguarding/index.shtml)

### **Mission Statement**

The International Services (IS) Mission is to advance the Agency's mission of protecting the health and value of U.S. plant and animal resources through its overseas programs and workforce.

### **Nature and Structure of Program**

IS' presence abroad enables the Agency to monitor and respond to pest and disease threats, develop international strategies and partnerships to prevent their spread to the United States, and support U.S. agricultural trade through the resolution of technical barriers. Through its services, IS contributes directly to global food security by promoting safe global trade and facilitating the development of science-based regulatory systems around the world. IS works closely on an ongoing basis with its sister units, including VS, PPQ, BRS, WS and other headquarters staff to ensure that its day-to-day work overseas reflects the priorities of these domestic programs. This collaboration is key to IS' success and is achieved through joint planning, enhanced communications, clear direction to the field, and implementing coordinated strategies.

Consistent with the APHIS mission, IS' overall strategic goals are the following:

- IS Goal 1: Protect U.S. agricultural and natural resources by working with foreign governments to prevent the spread of high-risk plant pests and animal diseases.
- IS Goal 2: Facilitate the safe international movement of agricultural commodities, including those derived from modern biotechnology, through science-based regulations and internationally accepted standards.
- IS Goal 3: Enhance global health and U.S. biosecurity through the development of science-based regulatory systems and policies around the world.

IS supports APHIS Program Unit work overseas related to technology transfer through creating linkages and supporting partnerships, collaborations and cooperative programs.

## **National Institute of Food and Agriculture (NIFA)**

<http://www.csrees.usda.gov/>

### **Mission Statement**

NIFA's mission is "Leading food and agricultural sciences to create a better future for the nation and the world." NIFA advances knowledge for agriculture, the environment, human health and



well-being, and communities by providing leadership and grant funding to help support research, education, and extension programs in the Land-Grant University System and other partner organizations.

### **Nature and Structure of Research Program**

NIFA's two key mechanisms for accomplishing its mission are:

- National program leadership. NIFA helps states identify and meet research, extension, and education priorities in areas of public concern that affect agricultural producers, small business owners, youth and families, and others.
- Federal assistance. NIFA provides annual formula grants to land-grant universities and competitively granted funds to researchers in land-grant universities, other universities, and other partner organizations.

NIFA collaborates or has formal working partnerships with many institutions and individuals. Our key partners are the institutions of higher learning making up the Land-Grant University System. However, we also partner with other federal agencies, within and beyond USDA; non-profit associations; professional societies; commodity groups and grower associations; multistate research committees; private industry; citizen groups; foundations; regional centers; the military; task forces; and other groups.

NIFA and its partners focus on critical issues affecting people's daily lives and the nation's future. The advanced research and educational technologies NIFA supports empower people and communities to solve problems and improve their lives on the local level.

Among the many programs NIFA leads, many are currently focusing efforts on the following societal challenges:

- Advance our ability to provide global food security and fight hunger
- Create a resilient and environmentally sustainable agricultural system responsive to climate change
- Enable U.S. energy independence through the development of sustainable bioenergy feedstocks and value-added bio-based industrial products
- Combat childhood obesity by ensuring the availability of affordable, nutritious food and providing individuals and families science-based nutritional guidance
- Reduce the incidence of food-borne illness and provide a safer food supply

NIFA does this not only through their research and higher education programs, but also through an extensive network of state, regional, and county extension offices in every U.S. state and territory. These offices have educators and other staff who respond to public inquiries and conduct informal, noncredit workshops and other educational events. Extension education for all citizens is also provided nationally online through eXtension.org.

Moreover, with support from more than 600,000 volunteers, 4-H—USDA's 105-year-old youth development program administered through NIFA—engages more than 6.5 million young people every year and teaches them life skills through hands-on learning and leadership activities.

### **Current Technology Transfer Goals, Objectives, and Measures of Success (Metrics)**

Applicants or recipients of NIFA grants that support basic science research - including the Agriculture and Food Research Initiative (AFRI) and the Sustainable Agriculture Research and Education (SARE) program - are encouraged to explore potential commercialization through the Small Business Innovation Research (SBIR) program. Conversely, small business owners or other grant recipients are encouraged to use NIFA-funded basic research programs to enhance innovation and competitiveness in their commercial operations.

Each land-grant university funded by NIFA has a university technology transfer office to promote, support and improve technology transfer from academic and nonprofit institutions. They often manage and license innovations derived from research at their universities (including research funded by NIFA) and are a good source to link small businesses with university faculty. Moreover, the Cooperative Extension System Offices are a nationwide, non-credit educational network. These offices are staffed by one or more experts who provide useful, practical, and research-based information to agricultural producers, small business owners, youth, consumers, and others in rural areas and communities of all sizes.

#### USDA 27: New Metrics (beginning FY 2013) on NIFA outcomes:

- Invention/Patent related metrics
  - number of inventions/patents jointly invented and owned by universities receiving NIFA grant funds and USDA intramural research
  - number of inventions/patents jointly invented and owned by small businesses receiving SBIR grant funds
- Job Creation
  - Number of new jobs created by a small business as the result of receiving SBIR grant funds
- Sales Income
  - Increase in sales of technology or services developed by a small business as the result of receiving SBIR grant funds
- Licensing
  - Sale to other businesses of licenses to technology developed by a small business as the result of receiving SBIR grant funds

### **Strengthening Current Activities**

NIFA plans to promote SBIR funding opportunities to USDA intramural research CRADA partners through a partnership between NIFA's SBIR national program leaders and the Agricultural Research Service (ARS) Office of Technology Transfer.

### **New Initiatives**

- Through a partnership with ARS (see USDA 8), NIFA will inform those who have applied to the NIFA SBIR program of potential partnership possibilities and benefits with ARS scientists. Notification to the SBIR applicant would be made after NIFA SBIR

program managers have completed disposition of SBIR applications.

- Joint intellectual property potential (ARS can file patent applications for CRADA partners and only charges the partner for filing fees, patent application and prosecution completed by registered USDA patent agents provided free of charge saving small businesses substantial costs)
- CRADA partners can work with ARS to utilize the benefits of the ATIP Foundation
- Partner with ARS for their joint ARS / ATIP “Forum” series (see [USDA 7](#))
  - NIFA’s relationship with the Cooperative Extension System and the Regional Rural Development Centers will enable improved coordination and partnership with ARS intramural research to improve technology transfer that is relevant to stakeholders. This will increase the likelihood of success of technology transfer by the agricultural sector partners of USDA.
  - Partner with ARS on forums on bioenergy feed stock development
  - Partner with ARS, Rural Development, and ATIP Foundation to coordinate economic development funding from public and private sources

USDA 28: Partner with ARS and the Animal and Plant Health Inspection Service (APHIS) at USDA on the National Plant Diagnostic Network, and the National Animal Health Laboratory Network

- Develop competitive funding opportunities to include ARS scientists in the development of diagnostic assays and validation protocols that are needed to support APHIS regulatory surveillance efforts for foreign and emerging plant and animal diseases
- Coordinate APHIS regulatory and ARS research efforts with relevant components of the Cooperative Extension Service in order to better identify producer needs and the transfer of relevant technology

**SECTION B: AGENCIES THAT CONTRIBUTE TO ECONOMIC VIABILITY OF U.S. FIRMS IN THE AGRICULTURE SECTOR THROUGH PROGRAMS THAT SUPPORT BUSINESS SUCCESS.****Economic Research Service (ERS)**

<http://www.ers.usda.gov/>

**Mission Statement**

The ERS mission is to anticipate economic and policy issues related to agriculture, food, the environment, and rural development, and conduct economic research that broadly and specifically informs public program and policy decisions.

**Nature and Structure of Research Program**

ERS follows the general USDA definition of technology transfer as the adoption of research outcomes for public benefit. ERS conducts relevant and objective economic research and policy analyses that inform program and policy decisions. ERS designs its research to demonstrate to its customers the consequences of taking alternative policy or programmatic pathways. Our data and market analysis program provides crucial market and trade outlook information to help farmers and agricultural companies run successful businesses and support jobs

ERS is also the primary source of statistical indicators that, among other things, gauge the health of the farm sector (including farm income estimates and projections), assess the current and expected performance of the agricultural sector (including trade), and provide measures of food insecurity here and abroad. ERS is one of the 14 officially designated (by OMB) federal statistical agencies.

ERS disseminates its research findings, market information, and statistical indicators in a variety of outlets including:

- Its website ([www.ers.usda.gov/](http://www.ers.usda.gov/));
- Its online magazine, *Amber Waves*;
- Outlook reports for specific commodity sectors
- ERS research and information reports; and
- Refereed journal articles, which assure the professional credibility of findings.

The ERS is located in Washington, DC, and has about 250 federal researchers working on socioeconomic research. Additionally, ERS seeks out academic and private sector collaborators through contracting and cooperative agreements to leverage external expertise to complement the knowledge of our intramural research staff.

### **Current Technology Transfer Goals, Objectives, and Measures of Success (Metrics)**

ERS uses a web-centric approach to communication with customers. Our goal is to convey clear, objective, and transparent research, data, and analysis to decision makers, policy officials, industry, non-governmental organizations, and the general public. All ERS research, data, and other information disseminated by the agency are available through the ERS website. ERS measures customer satisfaction with the ERS website using a survey based on American Customer Satisfaction Index (ACSI). The measure tracks satisfaction of Web site users and provides a basis for comparison with similar government and private-sector Web sites. The target for this measure is at or above the average rating for government websites in the Information/News category.

### **Strengthening Current Activities**

ERS is currently enhancing and updating its website. ERS research, analysis and data will be easier to find, and dynamically displayed in multiple locations. The new website will feature more intuitive navigation for customers to enhance information delivery to customers. The website will also feature an enhanced experience for mobile users.

### **New Initiatives**

USDA 29: ERS is investigating wider use of social media and new technologies (such as mobile phone applications) to widen and expand the reach of our information services to the general public.

USDA 30: ERS is exploring new methods for evaluating economic impacts of research collaboration and partnerships between public agricultural research institutions and the private sector.

**National Agricultural Statistics Service (NASS)**

<http://www.nass.usda.gov/>

**Mission Statement**

“The National Agricultural Statistics Service provides timely, accurate, and useful statistics in service to U.S. agriculture. “

Statistics compiled by NASS are used by agricultural producers and businesses to ensure an orderly flow of goods and services among agriculture’s production, processing, and marketing sectors. Reliable, timely, and detailed crop and livestock statistics help to maintain a stable economic climate and minimize the uncertainties and risks associated with the production, marketing, and distribution of commodities.

NASS data are vital to policy makers, researchers and scientist in the agriculture community who depend on reliable and unbiased facts. The Census of Agriculture, conducted every 5 years, provides comprehensive, county level data about agricultural communities across America. The statistical data provided by NASS are essential to both the public and private sectors for making effective policy, production, and marketing decisions on a wide range of agricultural demographics and commodities.

**Nature and Structure of Research Program**

NASS primarily conducts applied research to improve and enhance the Agency’s census and survey programs. Research strives to increase efficiency, accuracy and quality of official estimates by improving statistical and survey methodology.

The Research and Development Division of NASS is located in Fairfax, VA and has about forty permanent federal researchers working on the various statistical, methodological, and geospatial research. Additionally, NASS seeks out academic and industry leaders through contracting and with cooperative agreements to assist in solving significant problems.

NASS does special tabulations of its data and makes unpublished data available in Data Labs to other government agencies and university researchers who have significant questions that NASS data can help to answer. Advanced security technology allows access to data, which is tightly controlled and monitored to ensure all output retain the confidentiality of the farmer’s data.

**Current Technology Transfer Goals, Objectives, and Measures of Success (Metrics)**

Advanced geospatial technology has made it possible to deliver the NASS Cropland Data Layer (CDL) to users for their own research and analysis. CropScape, a state-of-the-art portal features a web-service based interactive map visualization, dissemination, and querying system. This portal is readily available to anyone with an internet connection.

### Foreign Agricultural Service (FAS)

<http://www.fas.usda.gov/>

#### Mission Statement

The Foreign Agricultural Service (FAS) links U.S. agriculture to the world to enhance export opportunities and global food security.

#### Nature and Structure of Program

In addition to its Washington, D.C. staff, FAS has a global network of 98 offices covering 162 countries. These offices are staffed by agricultural attachés and locally hired staff who are the eyes, ears, and voice for U.S. agriculture around the world. FAS staff identify problems, provide practical solutions, and work to advance opportunities for U.S. agriculture and support U.S. foreign policy around the globe.

#### Trade Policy

FAS expands and maintains access to foreign markets for U.S. agricultural products by removing trade barriers and enforcing U.S. rights under existing trade agreements. FAS works with foreign governments, international organizations, and the Office of the U.S. Trade Representative to establish international standards and rules to improve accountability and predictability for agricultural trade.

#### Market Development and Export Assistance

FAS partners with more than 75 cooperator groups representing a cross-section of the U.S. food and agricultural industry and manages a toolkit of market development programs to help U.S. exporters develop and maintain markets for hundreds of products. FAS also supports U.S. agricultural exporters through export credit guarantee programs and other types of assistance.

#### Data and Analysis

FAS's network of global contacts and long-standing relationships with international groups contribute to the agency's unique market intelligence capacity. FAS analysts provide objective intelligence on foreign market opportunities, prepare production forecasts, assess export marketing opportunities, and track changes in policies affecting U.S. agricultural exports and imports.

#### International Development

FAS leads USDA's efforts to help developing countries improve their agricultural systems and build their trade capacity. FAS also partners with the U.S. Agency for International Development to administer U.S. food aid programs, helping people in need around the world. FAS's non-emergency food aid programs help meet recipients' nutritional needs and also support agricultural development and education.



**New Initiatives Relevant to Technology Transfer and Commercialization Through Partnerships**

In partnership with ARS:

USDA 31: Engage in consultation with the Agricultural Technology Innovation Partnership program (ATIP) to assist in establishing US commercial partners with foreign entities.

USDA 32: Provide assistance to ATIP members and their U.S. business clients in finding export opportunities for goods and services arising from USDA innovations.

### **Rural Development (RD)**

<http://www.rurdev.usda.gov/Home.html>

### **Mission Statement**

USDA Rural Development's mission statement is “To increase economic opportunity and improve the quality of life for all rural Americans”. The USDA, Rural Development Mission Area is composed of the Rural Business-Cooperative Service, Rural Housing Service, and the Rural Utilities Service.

### ***Cooperatives Program***

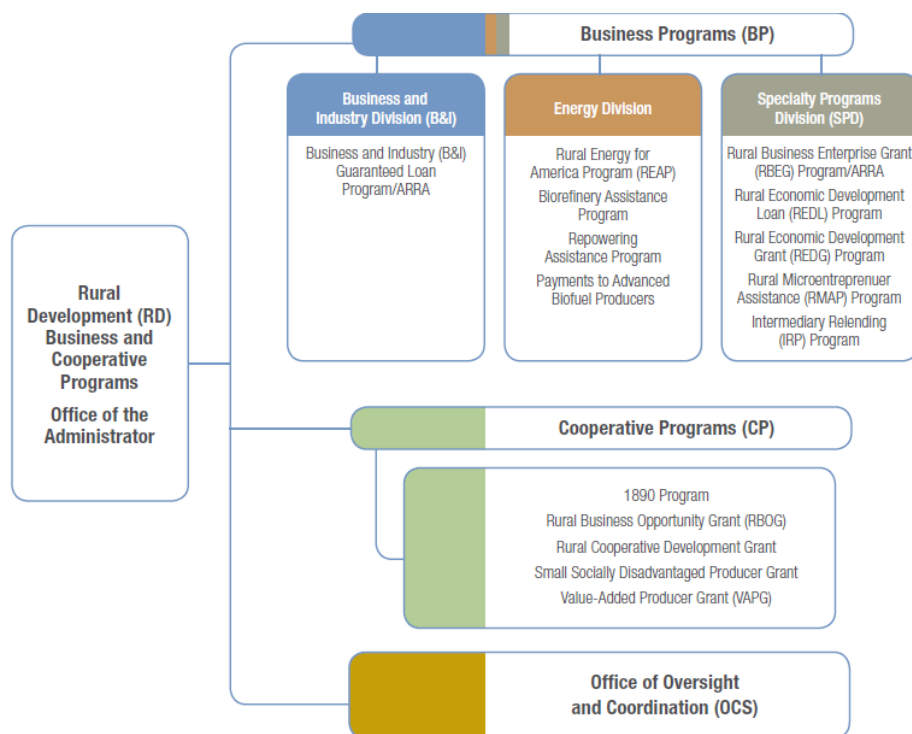
The mission of Cooperative Services Program is to promote understanding and use of the cooperative form of business as a viable organizational option for marketing and distributing agricultural products.

### ***Business Programs***

The mission of Rural Development Business and Cooperative Programs (BCP), and the Business Programs (BP) is to promote a dynamic business environment in rural America.

### **Nature and Structure of Programs**

USDA, Rural Development encourages the establishment and growth of rural businesses and cooperatives to provide good jobs and diverse markets; provides access to technical assistance, capital, and credit for quality housing, as well as for modern, essential community facilities; finances the development of electric, telephone, telecommunication, water and wastewater infrastructures to create modern, affordable utilities; and provides information and technical assistance to rural areas to design and implement their own rural development initiatives through regional capacity building.



**Business Programs (BP)** work in partnership with the private sector and the community-based organizations to provide financial assistance and business planning. BP helps fund projects that create or preserve quality jobs and/or promote a clean rural environment. The financial resources of BP are often leveraged with those of other public and private credit source lenders to meet business and credit needs in the under-served areas.

## ***Specialty Programs Division** (select programs described below)*

These specialized programs provide smaller-scale financial support to a variety of initiatives. Whether obtained directly or through intermediaries such as utilities or telecom providers, grants or loans can be utilized to help communities and businesses overcome hardships. Extend the reach of health care providers and higher learning. Help new ventures find their footing.

**Rural Business Enterprise Grant (RBEG) Program:** The Rural Business Enterprise Grant (RBEG) program is administered at the state level, through a network of field staff. This network is made up of 47 Rural Development state offices, supported by local and area offices. The RBEG program provides grants for rural projects that finance and facilitate the development of small and emerging rural businesses, help fund business incubators, and help fund employment-related adult education programs. To assist with business development, RBEGs may fund a broad array of activities.

Rural Microentrepreneur Assistance Program (RMAP): RMAP makes loans and awards grants to further the development of the smallest of rural businesses. The program includes the following definitions: Rural Microenterprise: A business located in a rural area that employs 10 or fewer full-time employees. Microloan: A loan of \$50,000 or less that must carry a fixed interest rate. Microenterprise Development Organization: A nonprofit, tribe or institution of higher learning.

### *Energy Division*

Rural Development is leading efforts in finding energy solutions in the agriculture sector. RD provides funding for the development and commercialization of renewable energy sources – including wind, solar, geothermal, hydrogen, ocean waves, hydroelectric, biomass, and biofuel (ethanol, biodiesel, etc.). By making renewable energy sources commercially viable, USDA Rural Development is also creating sustainable opportunities for wealth, new jobs, and increased economic activity in rural America. Programs include *Rural Energy for America Program (REAP)*, *Value-Added Producer Grant Program*, *Business and Industry (B&I) Guaranteed Loan Program*, *Biomass Research and Development Program*, *Biorefinery Assistance Program*, and the *Repowering Assistance Program*.

**Cooperatives Programs** (CP) is responsible for the delivery of the Value-Added Producer Grant (VAPG), Rural Cooperative Development Grant (RCDG), Small Socially Disadvantaged Producer Grant (SSDPG), Rural Business Opportunity Grant (RBOG) and 1890 Land Grant Institutions Rural Entrepreneurial Outreach and Development Initiative (1890) programs. The primary objective of this funding source is to encourage research through cooperative agreements on critical issues vital to the development and sustainability of user-owned cooperatives as a means of improving the quality of life in America's rural communities. Cooperative agreements are awarded on the basis of merit, quality, and relevance to advancing the purpose of federally-supported rural development programs that increase economic opportunities in farming and rural communities. These awards serve cooperative members, directors, management, educational institutions, organizations, rural residents, and all others with an interest in the cooperative form of business to assist them to effectively use cooperatives to improve their economic well-being and quality of life.

The VAPG program encourages independent agricultural commodity producers to further refine or enhance their products, thereby increasing their value to end users and increasing the returns to producers. Since 2001, CP has awarded over 1,350 planning and working-capital grants for a wide array of products, including projects for specialty meats, vegetable and dairy products, forest products and renewable energy.

The RCDG program provides grants to public, nonprofit organizations and institutions of higher learning to establish and operate centers for cooperative development. The primary purpose of these centers is to provide technical assistance to improve the economic condition of rural areas through the development of new cooperatives and improving the operation of existing cooperatives.

The SSDPG program provides grants to cooperatives or associations of cooperatives whose primary focus is to provide assistance to small, minority producers and whose governing board and/or membership is composed of at least 75 percent minorities. The primary objective of this grant program is to assist small, minority producers through cooperatives and associations of cooperatives.

The RBOG program provides grant funds to promote sustainable economic development in rural communities with exceptional needs through provision of training and technical assistance for business development, entrepreneurs and economic development officials, and to assist with economic development planning.

**CP conducts research** to provide the knowledge base necessary to support cooperatives dealing with changing markets and business trends. Projects are not such that intellectual property is a likely outcome. Rather, research is designed to have direct application to current and emerging requirements of cooperatives. The objective of the CP research program is to increase farm income and the economic welfare of rural residents by improving the overall operations of farmer cooperatives. Research helps cooperatives maintain and enhance their long-term ability to serve farmer-members and other rural residents through formulation of strategic responses to sweeping changes occurring in the agricultural and food manufacturing sectors.

The CP research program uses a combination of resources, including CP staff and university researchers under cooperative agreements, to address an array of topics relevant to cooperatives. Studies include financial, structural, managerial, policy, member governance, legal and social issues, as well as various other economic activities of cooperatives. A major challenge is to analyze industry structure and cooperative operational practices to determine the changes required to maintain or achieve a producer-oriented marketing system.

Cooperative statistics are collected annually to detect growth trends and changes in structure and operations of cooperatives. Data help identify and support research and technical assistance activities. This information is used extensively by legislative and executive branches of government in formulating agricultural and cooperative-related policy.

## **Education and Information**

CP maintains a storehouse of information about cooperatives which it makes available to the public through more than 150 research reports, educational publications and videos which cover all aspects of cooperative operations. A bi-monthly magazine, *Rural Cooperatives*, reports significant achievement by cooperatives, the most advanced thinking of cooperative leaders, and highlights of agency research, technical assistance, and educational activities.

CP disseminates its research findings, educational information, and annual statistics report in a variety of delivery systems including:

- Its website (<http://www.rurdev.usda.gov/rbs/coops/csdir.htm>)
- Its online magazine, *Rural Cooperatives*;
- RBS research, information, and service reports; and

- Refereed journal articles, invited presentations to professional and sector organizations; and
- Partner websites via cooperative agreements including:

ATTRA, also called the National Sustainable Agriculture Information Service, provides sustainable agriculture information to those engaged in or serving commercial agriculture, such as farmers, ranchers, extension agents, farm organizations, and farm-based businesses. Clients can call in requests on a toll-free telephone line, visit the website that features publications, breaking sustainable agriculture news, and funding opportunities, and learn about relevant workshops and web-based presentations. (<https://attra.ncat.org/>)

AgMRC is an electronic, national resource for U.S. agricultural producers interested in value-added marketing for producers interested in value-added agriculture. Topics covered include commodities, market and industry trends, marketing outlets market research, and other recommended resources. AgMRC receives partial funding through the VAPG program mentioned earlier. (<http://www.agmrc.org/>)

### **New Initiatives, and Facilitating Commercialization Through Partnerships**

Given that RD programs support success by the private sector by providing assets that complement technologies, new initiatives relative to technology transfer and commercialization would be performed in cooperation with the Office of Technology Transfer in ARS.

Partner with ARS and ATIP in Executing “Forum” series of technology transfer events (see USDA 7)

**Agricultural Marketing Service (AMS)**

<http://www.ams.usda.gov/AMSV1.0/>

**Mission Statement**

The mission of AMS is to facilitate the strategic marketing of agricultural products in domestic and international markets, while ensuring fair-trading practices, and promoting a competitive and efficient marketplace to the benefit of consumers of U.S. food and fiber products. This includes distributing market information, developing grade standards—many of which are used in the voluntary grading programs funded by user fees—protecting producers from unfair marketing practices, random testing of commodities for pesticide residues, granting intellectual property rights protection to new plant varieties, and oversight of industry funded programs to promote agricultural products and research.

**Nature and Structure of Program**

The Agricultural Marketing Service (AMS) is a service-oriented organization that provides a vast array of marketing services to the agricultural industry. Its mission is derived from 50 statutes aimed at facilitating the marketing of food and fiber commodities in domestic and international commerce, commodity grade standards, and voluntary certification and inspection programs and laboratory testing. The challenge for AMS is to adapt these programs to changing marketing practices and technological advances and be responsive to the grading, quality and health issues facing domestic agriculture. AMS does not have a research and development program in place to address these needs. However, AMS works with other Federal, State and local agencies, academia and food and fiber industry stakeholders in developing and testing innovative technologies that improve upon current marketing tools and services in a cost effective way. Both AMS commodity and support programs and our stakeholders have benefited from this association.

**Current Technology Transfer Goals, Objectives, and Measures of Success (Metrics)**

Although AMS does not have a formal technology program in place, the agency does oversee the Plant Variety Protection Act (of 1970, and amended in 1994), which provides legal protection in the form of intellectual property rights to developers of new varieties of plants. The intent of the Act was to “encourage the development of novel varieties of sexually reproduced plants and tuber propagated plants and to make them available to the public, providing protection to those who discover, develop and/or breed new varieties, and thereby promoting progress in agriculture in the public interest.” In order to gain protection over their intellectual property, plant breeders must demonstrate that their new varieties are distinct from previously existing variety, uniform within each generation of reproduction, and stable across generations of reproduction. Once these standards have been met, plant breeders gain control over the marketing of their new variety (i.e., advertising, exportation, importation, and sales). The term of protection is 20 years for most crops and 25 years for trees, shrubs, and vines. This creates an incentive for investment in the development for new plant varieties. Thus, the PVP Act facilitates technology transfer by protecting the intellectual property rights of those individuals who discover, develop and/or breed new plant varieties.



The AMS' Plant Variety Protection (PVP) Office has the responsibility for administering the program and is user-fee funded. Since 1970, PVP Office has issued more than 7300 certificates of protection. The Office maintains crop databases for over 180 species including 70,000 commercial seed-reproduced varieties.

### **Strengthening Current Activities**

The PVP Office interacts with several Federal agencies and international organizations. These relationships help to coordinate the application of Federal regulations related to the marketing of plant varieties. For example, applicants for PVP certificates are required to submit seed samples or tissue cultures to support and enable their applications. These samples are stored at the National Center for Germplasm Resources Preservation (NCGRP) in Ft. Collins, Colorado. The PVP Office regularly discusses issues of common concern with NCGRP staff. A Memorandum of Understanding between the two programs is updated on a regular basis. The samples deposited in support of applications are released to others after the term of protection ends. The deposit form and SOPs are currently being updated to ensure that the eventual distribution of the samples is unencumbered by other intellectual property rights or regulations related to genetically modified crops.

Seeds from outside the United States must be accompanied by a phytosanitary certificate. When they are shipped into the U.S., they must be shipped to USDA's Animal and Plant Health Inspection Service, Plant Protection and Quarantine (PPQ) office. Once the seeds or tissues pass quarantine, PPQ sends them directly to NCGRP. Plant varieties also need to have a variety name that is unique for marketing purposes. The Federal Seed Act, administered by the AMS' Livestock and Seed (LS) Program, oversees truth-in-labeling laws to protect consumers. Such laws cover variety naming and trueness-to-variety testing. The PVP Office uses the services of the LS Program to determine if the variety names provided in PVP applications are acceptable. PVP Office also cooperates with the LS Program to provide descriptive information to compare to field observations for trueness-to-variety tests.

The U.S. is a member of The International Union for the Protection of New Varieties of Plants, known by its French acronym UPOV. The UPOV treaty sets forth the principles of how intellectual property rights are granted to plants. These principles are then used to enact legislation in each member country, such as the PVP Act and the Plant Patent Act. Regular meetings with UPOV working groups and the governing council help to update treaty language and processes. As a member of this treaty organization, the PVP Office provides information about what plant varieties are seeking PVP protection. Recently, UPOV released an online version of this information so it is more quickly available to member countries. (Previously, this information was released on CD-ROMs bi-monthly.) UPOV is also leading the discussion about harmonization of forms, processes, and the sharing of varietal descriptive information. The PVP Office is actively involved in these discussions.

The office prepares annual reports for the World Intellectual Property Organization to track the effectiveness of this form of intellectual property protection. These reports detail the number and

sources of new applications filed, and the numbers and sources of grants of protection. The most recent report was filed in March 2012.

## **Grain Inspection, Packers and Stockyards Administration (GIPSA)**

<http://www.gipsa.usda.gov/>

### **Mission Statement**

To facilitate the marketing of livestock, poultry, meat, cereals, oilseeds, and related agricultural products, and promote fair and competitive trading practices for the overall benefit of consumers and American agriculture.

*Strategic Plan:* Ensure fair and transparent markets free from deceptive and fraudulent practices, combined with recognized and reliable descriptors of crop quality and value, to promote economic health and prosperity in American agriculture. U.S. farmers produce a wide variety of agricultural products and the vast American infrastructure permits these products to be processed and distributed throughout the United States and international markets effectively and efficiently. The markets serviced by GIPSA represent a total economic value of approximately \$170 billion annually with exports contributing over \$28.7 billion to the U.S. economy.

### **Nature and Structure of Research Programs**

GIPSA maintains a strong presence, domestically and internationally, in the development, evaluation, and implementation of practical grain quality assessment and inspection methods. Our laboratories work with the latest technologies, and through these technologies and our ongoing efforts, we're helping improve the quality of U.S. grain available to the global market. But to enhance the marketing and facilitation of grain into the future, we're also conducting internal research and participating in development and collaborative efforts with other governmental entities, laboratories, and private business. The research and analysis we conduct is in response to clear and widespread market needs. In general, GIPSA research is highly “applied” in that GIPSA’s successful projects result in direct and immediate use in the US grain industry. GIPSA also develops written information for customers and stakeholders, including scientific publications, publications in trade journals, and reports to stakeholders.

As agricultural crops evolve and varieties with enhanced traits are developed, reliable tests must be developed to quantify the quality traits important to the market. GIPSA conducts a research program to assess the performance of rapid test kits that are designed for detecting and/or quantifying the presence of mycotoxins in grain or for detecting the presence of specific biotechnology-derived traits in grain to allow test kit manufacturers to make verified claims regarding their products. GIPSA research results in new applications of existing technologies (such as near-infrared spectroscopy and nuclear magnetic resonance) and improvements in those technologies to meet identified market needs for grain quality assessments. Being able to accurately predict the end-use quality of wheat has become a major objective in recent years. Millers, bakers, and grain processors are looking to rapid industry-applicable testing methods to replace or supplement current chemical and rheological tests. With the development of such new testing procedures, reference methods are needed to validate and improve their accuracy.

## **Current Technology Transfer Goals, Objectives, and Measures of Success (Metrics)**

### **Current Technology Transfer Initiatives**

Moisture measurement remains one of the most important official and commercial grain inspection activities because of moisture content's impact on end-use value (dry matter content) and storability. GIPSA research (in collaboration with ARS) has resulted in the Very High Frequency (VHF) Unified Grain Moisture Algorithm (UGMA)—an approach to grain moisture measurement that has the potential to improve grain moisture measurement by: 1) yielding improved accuracy, 2) permitting multiple manufacturers to design moisture meters that can use common calibrations and give equivalent results, and 3) reducing the cost of on-going calibration maintenance. GIPSA has worked closely with manufacturers for approximately ten years to develop instruments that could use GIPSA's UGMA technology successfully. GIPSA made the UGMA freely available as a public algorithm to facilitate adoption by multiple manufacturers. Two manufacturers have developed and commercialized UGMA-Compatible instruments and other manufacturers have expressed interest in developing such instruments. GIPSA's Grain Inspection Advisory Committee has encouraged the agency to proceed to implement the new moisture measurement technology to better serve the Agency's stakeholders. The dates for implementation are September 2012 and May 2013, with the transition dates for different crops selected to minimize the effects on the value of grain stocks. The impact of this research project is very high, with the potential to improve the accuracy of grain moisture measurements for the entire US grain industry and, eventually, for the global grain industry.

GIPSA is currently engaged in a cooperative research program with ARS, two Land-Grant universities, and a private company to develop a relevant and practical method for assessing the gluten strength of wheat. Guidance provided to GIPSA by our major stakeholders has indicated that gluten strength is probably the best definition of wheat end-use quality. GIPSA contributed to the project by acquiring and preparing representative samples, testing prototype instruments, contributing to algorithm refinement, and providing overall project coordination. If this project results in a market-acceptable method for assessing wheat gluten strength, GIPSA intends to implement Official testing services for gluten strength. This research could significantly benefit US wheat growers, handlers, and processors by directing wheat with certain properties to markets where it has highest value and by sending clear signals to producers regarding what varieties to grow to enhance the US reputation as a supplier of highest quality wheat.

GIPSA is collaborating with ARS and a university to conduct research on standardizing sorghum odor assessments. Sorghum inherently has a range of odors. Sorghum end-users may find different types and levels of odor unacceptable based on their preferences and the grain's intended end-uses. This variance poses many challenges for the sorghum industry. GIPSA's goal for this project is to ensure that the official system properly recognizes and characterizes these odors, particularly sorghum "storage musty" odor. Our research identified chemical compounds that could be used to "spike" clean sorghum to create "storage musty" reference samples. GIPSA surveyed key sorghum inspection personnel, obtained industry and end-user feedback on the sorghum odor reference, and presented

findings to the Grain Advisory Committee. Based on the results of the survey and feedback received, GIPSA selected a chemical “recipe” to use as the reference for “storage musty” sorghum. In 2012, GIPSA plans to prepare and distribute odor reference samples to all official inspection laboratories that inspect sorghum.

### **CRADA Activities**

When it would contribute to a project’s success, GIPSA works through ARS to establish CRADAs with Land-Grant universities or private industry. Most of GIPSA’s research projects; however, do not involve CRADAs. GIPSA does not have any active CRADAs at the present time.

### **Measures of Success**

The Agency gauges our success through feedback expressed from our Grain Inspection Advisory Committee members, consisting of U.S. producers, exporters, USDA Cooperator organizations, academicians, and other U.S. stakeholders. Another measure of our success is the number of quality and weight complaints we receive from our customers each fiscal year. In FY2011, GIPSA received nine quality complaints that involved about 0.6 percent by weight of the total amount of grain exported during the year. Another critical measure of success of GIPSA research is the commercialization and adoption of the methods developed by GIPSA research.

### **Strengthening Current Activities**

GIPSA participates in the Pesticide Data Program, a cooperative effort of the USDA, U.S. Environmental Protection Agency, and 10 participating States to monitor pesticide residue levels in fruits, vegetables, grain, dairy products, and other foods. GIPSA tests grain and grain-related products that are included in the program and develops new methods of analysis when necessary. In 2010, GIPSA developed two new analytical methods for oats and analyzed 300 oat samples. In 2011, GIPSA analyzed 300 soybean samples for this program.

**Harmonizing Biotech Reference Methods:** There is a need for highly specific and accurate tests for the various genetically-engineered (GE) crops grown in the United States. GIPSA has developed intra-laboratory validated real-time polymerase chain reaction methods and has evaluated the accuracy, reliability, and proficiency of publicly available methods used to detect and identify GE grains and oilseeds. GIPSA participated on a scientific panel of experts engaging U.S. stakeholders and influencing outcomes on issues related to testing of GE traits in grains with the goal of developing global scientific consensus regarding the analysis of transgenic events. GIPSA continues to collaborate with international organizations such as Codex Alimentarius, International Organization for Standardization, Association of Analytical Communities, American Association of Cereal Chemists, American Oil Chemists’ Society, Institute for Reference Materials and Measurements, Canadian Grain Commission, and the National Institute for Standards and Technology to harmonize testing technologies for GE grains and oilseeds. Many of these collaborations result in publications in peer-reviewed scientific journals.

**Food and Agricultural Organization/World Health Organization Codex Committee on Methods of Analysis and Sampling:** GIPSA staff served as members (alternate delegate and technical expert on sampling) of the U.S. delegation to the Codex Committee on Methods of Analysis and Sampling meeting held in March 2012 in Budapest, Hungary. The U.S. delegation actively participates in continuing discussion on uncertainty of sampling, conformity assessment, and processes for resolution of disputes.

**Technical Assistance:** In FY 2011, GIPSA responded to customers' needs for technical assistance in foreign markets. Exporters, importers, and end- users of U.S. grains and oilseeds, as well as other USDA and U.S. Government agencies, USDA Cooperator organizations, and other governments, occasionally ask for GIPSA personnel to provide expertise. These activities include representing the Agency at grain marketing and grain grading seminars, meeting with foreign governments and grain industry representatives to resolve grain quality and weight discrepancies, helping other countries develop domestic grain and commodity standards and marketing infrastructures, assisting importers with quality specifications, and training local inspectors in U.S. inspection methods and procedures.

**Food Safety Inspection Service (FSIS)**

<http://www.fsis.usda.gov/>

**Mission Statement**

The Food Safety and Inspection Service (FSIS) is the public health agency in the U.S. Department of Agriculture responsible for ensuring that the nation's commercial supply of meat, poultry, and egg products is safe, wholesome, and correctly labeled and packaged.

**Nature and Structure of Research Program Through Partnerships**

Although FSIS does not conduct research, through its Research Priorities Review Panel, FSIS routinely identifies research that will facilitate the accomplishment of the Agency's mission in the constantly shifting food safety landscape and prioritizes that research. Current FSIS Research Priorities include developing analytical methods that increase the efficiency of analysis, identifying and understanding emerging hazards (including drug resistant pathogens), identifying and evaluating hazard mitigation techniques (e.g. pathogen interventions), and evaluating the effectiveness of Agency regulations.

As FSIS is not a research funding agency, FSIS addresses its research priorities through partnerships with the USDA Agricultural Research Service, USDA National Institute of Food and Agriculture, FDA Center for Veterinary Medicine, FDA Center for Food Safety and Applied Nutrition, and the Department of Health and Human Services' Centers for Disease Control and Prevention (CDC). Communication of FSIS Research Priorities is facilitated by the annual ARS-FSIS Food Safety meeting (which includes FDA, CDC, EPA, and AMS participation). Additionally, FSIS communicates its research priorities to ARS through quarterly meetings with ARS Food Safety National Program Leaders and by FSIS participation in the ARS Scientific Quality Review Program, the Research Position Evaluation System, and Research Scientist application evaluation. FSIS encourages alignment of FSIS Research Priorities with NIFA-funded research opportunities via meetings with NIFA Food Safety National Program Leaders, FSIS scientist participation in the review of NIFA grant proposals, and FSIS scientist participation on scientific advisory committees for NIFA-funded research. FSIS Scientific Liaisons are charged with communicating FSIS's research needs to ARS, NIFA, and CDC.

FSIS is considering including the URL for the FSIS Research Priorities link on future NIFA SBIR Food Safety Requests for Proposals. If successful, this action should increase interest in developing commercial products that contribute to the safety of FSIS regulated products.

In addition, the FSIS list of Research Priorities is communicated to other agencies, as well as to our stakeholders, through a posting on the FSIS website.



### **Facilitating Commercialization**

By addressing FSIS Research Priorities, researchers can develop analytical methods and products that can lead to commercial products. For example, methods developed by ARS researchers to address FSIS Research Priorities are transferred to and validated by FSIS regulatory laboratories. These official methods provide performance criteria for commercial development of laboratory and field adaptable analytical instrumentation and rapid-analysis kits for use by industry and by FSIS inspection personnel. Official methods also facilitate the commercial development of reagents and supplies.

Applications for proposed commercial pathogen interventions are evaluated by FSIS. If there are no objections, the Agency issues a “no objection” letter, which may facilitate the commercial use of the product for FSIS regulated products.

### **Measures of Success (Metrics)**

FSIS collaboration with ARS has led to the development of method and technologies that are now broadly used by industry as well as by the Agency. In some cases, the ARS research prototype products have been adapted by FSIS, and then industry has stepped in to further develop the application. One measure of FSIS’s success is its ability to deploy laboratory technologies that allow it to monitor the meat and poultry supply and minimize human exposure to hazards. FSIS also offers technology training in official laboratory methods to countries deemed to have equivalent food safety systems. Finally, FSIS is prominently involved in the development of international standards by its interaction with the Codex Alimentarius Commission, where an FSIS leader is the Chair of the Codex Committee for Food Hygiene.

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